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GUIDE ON **edp** ADMINISTRATION

FOR DEPARTMENTS AND AGENCIES OF THE GOVERNMENT OF CANADA





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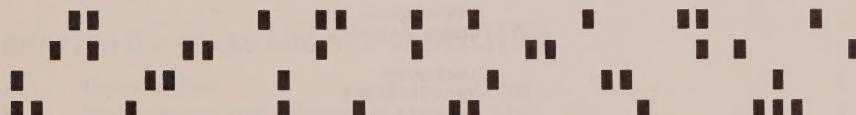
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GUIDE ON **edp** ADMINISTRATION

FOR DEPARTMENTS AND AGENCIES OF THE GOVERNMENT OF CANADA



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GUIDE ON EDP ADMINISTRATION

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A. THE PURPOSE OF THE GUIDE

The purpose of this Guide is to encourage the proper use of electronic data processing (EDP) by identifying the objectives which deputy heads and EDP managers should pursue in acquiring and administering the EDP resources required to support government programs, and by providing a framework for the co-ordination and control of EDP use in the public service in the interests of program effectiveness and economy. In more specific terms, the Guide endeavours to:

- summarize and explain the principal features of the EDP policy approved by the Treasury Board,
- define the role of the Treasury Board and other government departments and agencies with respect to EDP,
- provide departmental management with guidance in EDP planning and performance evaluation,
- indicate the manner in which various EDP activities should normally be conducted within the overall framework of approved policy,
- provide general guidance on practices which will increase the likelihood both that EDP facilities and projects will be effectively managed, and that individual EDP activities will be conducted in a manner which best serves the interests of the government as a whole.

The Guide will achieve its purpose only if it is accepted by the EDP community in the spirit in which it is offered. It attempts to treat EDP, not as an end in itself, but as a means of supporting departmental programs. It attempts to provide practical and useful tools both for EDP management and for EDP evaluation, to the extent permitted by the state of the art, and recognizes that the present tools will require constant modification and reshaping in the light of experience and technological change in order to remain relevant. Both the staff of the Information Systems Division of the Treasury Board Secretariat and their departmental counterparts will have to keep this approach in mind, and keep each other well informed of impending developments, if EDP policy and the tool to which it relates are to meet the needs of the public service in an adequate and flexible fashion.

B. CONTENT AND PRESENTATION

Two types of requirements are included in the Guide. The first type, identified as *directives*, is mandatory, and indicates those system elements essential to the attainment of policy objectives and to the effective control and co-ordination of EDP use in the public service. Deputy heads must implement requirements of this type. The second type, identified as *guidelines*, is not mandatory, but indicates courses of action or alternative courses of action recommended by the Treasury Board to implement its policy and directives. Deputy heads are normally expected to follow these courses of action, but are free to develop and implement alternatives which are consistent with the directives and more closely tailored to departmental circumstances and needs.

The Guide is available in two forms. The *Summary Volume* contains an abbreviated introduction and policy statement, lists the directives and guidelines approved by the Treasury Board, and provides a brief introductory note to each guideline topic. The Table of Contents of the Detailed Volume and its chapter on Roles and Responsibilities are included as appendices. The *Detailed Volume* (to which this chapter is the introduction), contains a fuller policy statement and a chapter to explain and indicate the application of each set of guidelines and to suggest satisfactory methods of implementation. The full text of the relevant directives and guidelines is reproduced at the beginning of each chapter.

Some readers will notice the omission of sections dealing with the important concerns of right of access to information and of individual privacy as they relate to government computers. These concerns, particularly the latter, are the subjects of a special investigation being undertaken at cabinet direction under the joint chairmanship of the Departments of Communications and Justice. When that committee has decided on a course of action, it may be appropriate to include relevant portions of their approved instructions in this Guide.

It is difficult to develop an EDP guide which will make uniform good sense in all the differing EDP environments in the federal government to which this volume applies — particularly in an area of such rapidly changing technology as EDP. Especially during the first few years of its application, but also to a lesser degree thereafter, it is expected that alterations and revisions will be necessary. For this reason, the Guide is provided in the form of a set of pamphlets, punched for insertion in a three ring binder. Senior officers are invited to submit comments based on their experience with this Guide to the Director, Information Systems Division, Treasury Board Secretariat.

C. BACKGROUND

This Guide is the result of a recommendation made by the EDP Policy Project of the Treasury Board Secretariat. That project was initiated in February, 1971 because of concern in the Treasury Board about the rapid growth of government expenditures on electronic data processing, and because of uncertainty about the effectiveness and efficiency with which computers were being employed.

The objectives of the project were to review the current status of EDP and related government policies on the subject, to consider the future growth of EDP activities, and to recommend new policies for the future which would ensure the fullest and most effective use of EDP, both by each agency and by the government service as a whole.

The EDP Policy Project identified a number of key problem areas, of which those directly relevant to this Guide are:

- Planning, Development, Evaluation:
 - few measures of effectiveness,
 - no incentive to improve efficiency,
 - little evaluation of management, suppliers and consultants,

- plans geared to approval,
 - no post-evaluation of projects,
 - senior management not sufficiently involved,
 - programs delegated to technical people,
 - over-emphasis on equipment,
 - no reliable data on use of EDP resources,
 - duplication of development effort.
- Procurement:
- duplication of effort,
 - waste of acquired knowledge,
 - high cost of tendering.

The findings of the EDP Policy Project, and its policy recommendations, were reviewed at a series of meetings of the EDP Advisory Committee in 1971, and published in the "Report on Electronic Data Processing in the Federal Government of Canada" (Treasury Board Secretariat, November 30, 1971). The recommendations were approved by the Treasury Board at its meeting of January 20, 1972 (see Appendix I-1).

D. POLICY AND OBJECTIVES

The main features of the EDP policy approved by the Treasury Board are summarized below.

1. Overall EDP Policy

- EDP is a resource to be used in the development and operation of information systems designed to serve government in support of departmental programs, and is not an end in itself.
- The government will meet its needs for EDP services from the private sector, except when it is in the public interest or is more economical to provide these services internally.
- Most government EDP resources will be organized in the form of departmental centres, service-wide application centres and functional centres established to meet the needs of all departments and agencies in accordance with guidelines established by the Treasury Board.
- Departments and agencies will prepare EDP plans containing information on their projects, equipment and personnel, and the Treasury Board Secretariat will develop a master plan for EDP in the government.
- The tender process is to be retained for the acquisition of EDP equipment and services, except where it is clearly in the government's interest to negotiate directly with suppliers.

- The Department of Supply and Services will develop an efficient and effective EDP procurement organization to service all departments and agencies.
- The Department of Communications (Government Telecommunications Agency) will carry out its responsibility for government telecommunications in support of EDP policy.

2. Policy Objectives

The more detailed objectives of EDP policy are:

- To provide an environment for equipment, personnel and supporting services that will optimize the contribution of EDP to government in total, while recognizing the respective roles of departments and central agencies.
- To allow acquisition of equipment and services of an optimum quality with timely delivery and least cost, and consistent with any national industrial strategy established for Canada.
- To ensure that the full cost of EDP use is accounted for and made visible, both when in-government EDP resources are used and when external EDP resources are used.
- To provide for evaluation of EDP programs before, during and after implementation in order to:
 - ensure that efficiencies and economies are achieved,
 - assess whether program objectives have been fulfilled,
 - use proven experience and techniques to maximum advantage,
 - provide a mechanism for feedback of information on related activities to senior departmental personnel,
 - encourage management at the user level to be conscious of computer systems output in terms of quality, timeliness, accuracy, usefulness in decision-making and cost.
- To enhance the development of sound government-wide information systems as required.
- To allow the development, retention and optimum utilization of qualified technical and managerial EDP personnel.
- To prevent, wherever possible, duplication in the development and maintenance of EDP projects and data bases.

3. Policy Implementation

In accepting the report, the Treasury Board directed the Secretariat to take several actions, of which the development of this Guide is but one important part.

The Information Systems Division (ISD) was established in the Treasury Board Secretariat in 1972 to oversee the implementation and administration of the policy. It started its work by developing the "EDP Master Plan", released in February, 1973 (see Appendix I-2), which indicated specifically which departments would be custodians and which participants in specific departmental, functional and service-wide application centres. This plan provides the framework within which departmental EDP plans should be developed; the Guide is intended to provide direction and assistance to departments as they formulate plans and take executive action within the framework.

The subjects requiring guideline development were divided into ten studies corresponding to chapters II to XI of this Guide. After approval of the specific objectives and terms of reference by the EDP Advisory Committee in November, 1972, project teams were formed in each study area to develop a first draft of the appropriate chapter. Although the studies were under the general direction of the Information Systems Division of the Treasury Board Secretariat, the leaders of the individual project teams and their participants were drawn, for the most part, from departments which are major users of EDP or which provide an important service to EDP users. The resulting drafts were edited by the ISD to form a coherent set, and circulated widely within the EDP community. As a result of this circulation and of the deliberations of the EDP Advisory Committee which considered each chapter in detail, further alterations were made.

The complete Guide was endorsed by the EDP Advisory Committee at a series of meetings between September, 1973 and January, 1974, and was approved for publication by the Treasury Board at its meeting on February 28, 1974. All updates and revisions to the Guide will have been reviewed by the EDP Advisory Committee and, where necessary, approved for publication by the Treasury Board, before circulation to departments.

E. UNDERLYING PHILOSOPHY

While the policy objectives and the proposed implementation method can be briefly stated, the philosophy underlying the implementation method is more difficult to explain, for it involves the rather complex lines of authority between Ministers and the Treasury Board and, at a lower level, between Deputy Heads and the Secretary of the Treasury Board.

On the one hand there is the predominant philosophy which can be summarized as "let the managers manage", with its implication of minimal Treasury Board intervention. On the other hand is the current government practice of tying program justification to the budgetary process (PPB), with its implications of intervention by the Treasury Board and its Secretariat at least at the planning stage of programs and sometimes in their evaluation.

Apart from the importance in government terms of having an agency somewhere which can assess the relative merits of competing programs (however difficult this may be in practice), intervention by a central agency can only be justified if the benefits gained by productive central agency input outweigh the inevitable costs of communicating and the diminished sense of responsibility on the part of managers which can easily result.

Insofar as EDP is concerned it is felt that given its pervasiveness, and the difficulty which many managers have in keeping abreast of new EDP developments, it is useful at this time for the Treasury Board to monitor EDP activities more closely (in most instances) than the mainstream activities which they support. This apparently anomalous situation, which was raised as an issue by the EDP Policy Project report, has come about for the following reasons:

- Although senior departmental management is normally well endowed with the expertise needed to administer their mainstream activities, there is some evidence that EDP proposals placed before them for decision have not had the same informed scrutiny as proposals related directly to mainstream activities. Since EDP aspects of departmental activities often have a vital impact on mainstream programs, a closer monitoring by a central pool of EDP expertise seems advisable. Indeed the fact that the EDP Policy Project came into being in the first instance, and that it had from the beginning the support of the Senior EDP Advisory Committee, is evidence of the existence of significant problems.
- EDP expenditures have been growing at between 20% and 25% a year. When growth is taking place at such a rapid rate it is often possible to prevent unnecessary duplication by some measure of central co-ordination.
- EDP lends itself to the sorts of controls planned, where other large expenditures tend to be departmental in nature (and likely to remain so) and can best be controlled by existing departmental structures and parallel Program Branch structures. The closest parallel to the EDP situation is probably that of telecommunications, where the Government Telecommunications Agency was established (originally as part of the Treasury Board Secretariat).
- EDP is becoming increasingly interdepartmental in nature. In such circumstances some central activity is desirable to help encourage a co-ordinated approach.

The monitoring and co-ordination process will only work if both parties understand the objectives and limitations of the system. The Information Systems Division of the Secretariat can question proposals and decisions, but since it does not assume responsibility for departmental programs, it cannot impose solutions. At the same time, departmental EDP officers who consult with ISD at an early stage of planning have nothing to lose and much to gain. The motivational effect of being informed early is hard to underestimate. It makes it easy for constructive criticism to be injected when it will be most helpful, and makes it harder for destructive criticism to be justified at a later and more harmful stage, since the criticizer stands accused by his earlier silence.

Such questions are particularly relevant when considering the requirement for departments to produce an annual EDP report. This report is designed to ensure that senior management in departments are provided with the key facts

and figures related to the use and operation of EDP in their department at least once a year, as well as to provide the Information Systems Division with sufficient information to obtain a perspective on EDP in the federal government. By combining the two requirements in one document, it is hoped that the departmental workload will be reduced.

An experience is gained with the requirements set forth in the EDP guide, it will become evident that some of the formal reporting requirements are more useful than others, or that the reporting burden of some is disproportionate to their utility. On the other hand, new EDP activities may assume temporary or semi-permanent importance and require additional reporting detail. With the help of departments, the Information Systems Division will undertake to review the formal requirements as often as necessary to ensure that a reasonable balance between information flow and reporting burden is maintained. The same effort will be made to ensure that other directives and guidelines are kept relevant to current requirements, and do not become a handicap to effective use of EDP.

F. APPLICATION

EDP policy, directives and guidelines apply to all departments and agencies named in Schedules A and B of the "Financial Administration Act" and to branches designated as departments for the purposes of that Act. Chapter X, "Security in an EDP Environment", is also applicable to agencies named in Schedule C of the Act.

EDP policy is concerned with all electronic data processing equipment, services and personnel which are used for any purpose in the government, except for analogue computers, desk calculators (including programmable desk calculators unless these are equipped with direct access memory in excess of 32,000 bits), accounting machines, military weapons systems, and EDP goods acquired as an integral part of a special purpose system which is not itself designed or easily used for general purpose data processing.

G. CANCELLATIONS AND IMPLEMENTATION

This Guide cancels Management Improvement Policy MI-5-68 (TB 682851) and supersedes the special references to EDP acquisitions contained in Circular No. 1970-5 (TB 692776) and other earlier instructions. It does not deal with the conditions and financial limits for authority to enter into contract, which are governed by the Government Contracts Regulations.

The earlier instructions dealing specifically with EDP which are superseded by this Guide include Treasury Board Circulars 1960-4, 1960-35, 1968-15 and 1969-19, and Information Bulletin 1966-1. The two earlier circulars which remain in force are 1972-24 and 1973-25, which are reproduced in Appendices I-1 and I-2.

The directives and guidelines contained in this Guide are effective immediately, except as qualified in the reporting instructions contained in Appendices III-1, VII-4 and VIII-3.

H. INQUIRIES

Inquiries regarding EDP policy and the directives and guidelines contained in this Guide should be directed to the Information Systems Division, Administrative Policy Branch, Treasury Board Secretariat. The Financial Management Division should be consulted regarding the relationship between Chapter VII, "EDP Financial Administration", and the "Guide on Financial Administration for Departments and Agencies of the Government of Canada".

**POLICY ON ELECTRONIC DATA PROCESSING
IN THE FEDERAL GOVERNMENT**
**(Text of Treasury Board Circular Letter 1972-24,
February 17, 1972)**

INTRODUCTION

Circular Letter 1971-6, dated January 20, 1971, announced the establishment of an EDP Policy Project in the Treasury Board Secretariat. Its objectives were to review the current status of electronic data processing and related policies, to consider the future growth of EDP activities and to recommend new policies which would ensure the fullest and most effective use of EDP. The Project team has now completed its report, and it has recommended a new policy framework governing the provision of EDP services throughout the Public Service. A copy of the final report, "Report on Electronic Data Processing in the Federal Government of Canada", is attached. The Treasury Board has reviewed these findings and approved the implementation of a new concept for the organization of EDP resources in the Federal Government. This decision has been confirmed by the Cabinet. This letter describes that new policy.

POLICY

Electronic Data Processing is a prime resource in the development and operation of information systems designed to serve government in total in support of departmental programs and to enable departments to fulfill their roles efficiently and effectively. Computer facilities will be organized in the form of Departmental Centres, Service-Wide Application Centres, and Functional Centres established to meet the needs of all departments and agencies, in accordance with the guidelines provided by Treasury Board.

The objectives of this policy are to provide an environment for equipment, personnel and supporting services that will optimize the contributions of EDP to government in total, while recognizing the respective roles of departments and Central Agencies; to allow acquisition of equipment and services of an optimum quality with timely delivery and least cost, and consistent with any national industrial strategy established for Canada; and to provide for evaluation of EDP programs before, during and after implementation. Detailed recommendations to implement this concept are given below.

APPROVED RECOMMENDATIONS

To create the proposed environment for EDP use and to fulfill the policy objectives, the following recommendations have been approved by the Treasury Board.

1. Strategy

A long-range strategy be adopted to organize all government EDP services into a structure consisting of:

APPENDIX I-1

- *Departmental Centres* – EDP installations located in a department and used primarily to provide services for dedicated systems in support of some unique departmental programs.
- *Service-Wide Application Centres* – centres of EDP expertise in some specialized aspect of computing created to serve identifiable government-wide processing systems in support of programs in all departments and agencies.
- *Functional Centres* – EDP facilities created to serve the EDP need of major programs of a number of specified departments which have related requirements for information and expertise.

2. Master Plan

- The Treasury Board Secretariat proceed with development of a master plan for EDP in the Federal Government in the light of the proposed policy with departments and agencies.
- Until this plan is completed, no new in-house computer centres will be approved for the Federal Government, except where departmental needs cannot be met by existing in-house installations and/or service bureaux in the private sector.
- As part of the plan for EDP, consideration be given to the identification of a centre of government expertise for research, development and testing of EDP techniques, devices and standards.

3. Information Systems Division

An Information Systems Division be created within the Administrative Policy Branch of the Treasury Board Secretariat to develop, disseminate and interpret policies and guidelines for EDP applications, procurement and operations; monitor the progress of government EDP; and ensure that experiences with EDP are shared among all departments and agencies.

4. Procurement

- The Department of Supply and Services complete its program to develop an efficient and effective procurement service for departments and agencies, in accordance with its existing legislative mandate.
- The procurement process be carried out in accordance with criteria and guidelines to be developed by the Treasury Board Secretariat in consultation with the Department of Supply and Services.
- The government will meet its need for EDP equipment and services from the private sector, except when it is in the public interest or it would be more economical to provide them internally. The use of any surplus capacity on existing government EDP resources be considered before new equipment or services are acquired.

- The tender process, in general, be retained for the acquisition of EDP equipment and services.
- Consultation with the Department of Industry, Trade and Commerce precede the tendering process for significant computer acquisitions in order that national objectives and industrial goals may be considered.

5. Consultations on National Objectives

Continuing consultations take place between the Treasury Board Secretariat and the Departments of Industry, Trade and Commerce, Consumer and Corporate Affairs, Communications, Supply and Services and others as necessary, on matters of mutual interest in order to ensure that the Treasury Board policies and guidelines in respect of EDP accommodate national objectives.

6. Computer Services Bureau

- The Computer Services Bureau be re-constituted as the nucleus of a Functional Centre with the related characteristics of such centres. As a result of the establishment of such a Functional Centre some existing departmental computer facilities will be discontinued.
- The accumulated deficit of the Computer Services Bureau be written off as of the date of such a re-constitution.
- For the interim, until the Computer Services Bureau is fully operational in its role as a Functional Centre, it continues its present activities in contracting for rental of computer time at outside service bureaux.

7. Personnel

- A thorough review of the classification and selection standards that apply to EDP personnel be made.
- Attention be directed on a priority basis by the Treasury Board Secretariat and the Public Service Commission to the planning and use of manpower in the EDP area.

8. Departmental EDP Plans

Departments and agencies prepare EDP plans containing information on their projects, equipment and personnel. Approval of this plan by the Treasury Board should replace the present series of submissions to the Board needed to implement departmental projects. As part of the process of approval, the Treasury Board Secretariat will identify certain EDP projects in departments with which it wishes to maintain continuing liaison.

Note: The format and timing of these plans will be established in guidelines to be developed by the Treasury Board Secretariat in consultation with departments. Until these guidelines are distributed the existing regulations (MI-5-68) will be followed.

APPENDIX I-1

9. Identification of Costs

Increased attention be given to the identification of costs of developing and operating EDP projects. Full costing systems should be introduced for all departmental and other EDP centres in accordance with guidelines to be developed by the Treasury Board Secretariat in consultation with departments.

10. EDP Advisory Committee

The EDP Advisory Committee remain in existence to advise on the policies to be developed by the Treasury Board Secretariat. Its composition and terms of reference be reviewed.

IMPACTS OF THE NEW POLICY

It is expected that the implementation of the new concept, which will take place over several years, will result in more efficient and effective EDP service to departmental programs, will enable us to take advantage of economies of scale and to make the best use of the professional EDP talent within the government, and will enable national objectives to be taken into account. It will provide for the orderly growth of EDP in the government and will result in an increased emphasis on the co-ordinated planning of EDP projects. In dollar terms, when implementation is completed, it has been estimated that a net annual saving of \$30 million should result.

APPLICATION

This policy applies to departments and agencies listed under Schedules A and B of the Financial Administration Act and to Branches designated as departments for the purposes of that Act.

It applies to electronic data processing equipment, services and personnel which are used for any purpose in the government except when they are used solely as an integral part of a process control loop, a scientific experiment or a military weapons system.

IMPLEMENTATION OF THE POLICY

The following basic steps will be taken to implement the policy.

- The Information Systems Division in the Treasury Board Secretariat will be staffed as quickly as possible.
- An interdepartmental task force will be organized to develop the master plan.
- The Computer Services Bureau will be re-constituted as a Functional EDP Centre serving some new departments while continuing to serve its current users until completion of the master plan.

APPENDIX I-1

- Guidelines and policy statements on the topics of departmental EDP plans, procurement, creation and use of the new EDP Centres, and EDP operations, will be prepared by the Treasury Board Secretariat in keeping with the Policy and Recommendations above.

I look forward to your co-operation, as we proceed to work out the details of the new concept and developing appropriate means of implementing this new policy.

**MASTER PLAN FOR ELECTRONIC DATA PROCESSING
IN THE FEDERAL GOVERNMENT**
**(Text of Treasury Board Circular Letter 1973-25,
January 30, 1973)**

INTRODUCTION

Circular Letter 1972-24, dated February 17, 1972, announced a new policy governing electronic data processing within the federal government, and directed that a Master Plan for the implementation of that policy be prepared by the Treasury Board Secretariat. Accordingly, the Information Systems Division of the Administrative Policy Branch undertook the preparation of the Plan, and has now completed its work. A copy of the final report, "The EDP Master Plan — An Action Plan for the Implementation of the Electronic Data Processing Policy in the Federal Government", will follow. The recommendations of this report have been reviewed and approved by the Treasury Board. This letter summarizes those recommendations of the Report which are of general interest, i.e., which affect more than one department or agency.

Summary of Master Plan Provisions

1. The Plan provides for the organization of EDP operations within the federal government in a structure composed of departmental centres, service-wide application centres, and functional centres, in the manner outlined in Circular Letter No. 1972-24. In particular, it provides for the immediate designation of eight departmental centres, namely:

Department of the Environment,
Atmospheric Environment Service

Department of National Defence
(incl. Defence Research Board)

National Research Council,
Communications Branch

National Revenue — Taxation

Royal Canadian Mounted Police

Statistics Canada

Department of Supply and Services
— Services

Department of Supply and Services
— Printing Operations.

APPENDIX I-2

Other departmental centres may be designated in future, if, at the time of the annual review of a department's EDP plans, it appears that certain selection criteria have been met. These criteria are discussed in the body of the Report; they will be revised, from time to time, to reflect economic and technological change.

2. The Report also calls for the creation of a number of functional centres, some of which will come into existence almost immediately, while others will be deferred for three years or more.

The functional centres which are to be created in the near term are listed below. The list shows the name of the centre, the participating departments, and indicates which among them is to be custodian.

Direct-Service I	Unemployment Insurance Commission (Custodian) Manpower & Immigration
------------------	--

Direct-Service II (DSS Contractual Relations)	National Health and Welfare Veterans Affairs (Supported by DSS (Services))
---	--

Revenue Collection	Taxation (Custodian) Customs and Excise
--------------------	--

Trade & Transportation	Transport (Custodian) Industry, Trade and Commerce Regional Economic Expansion
------------------------	--

Resources – Environment	Energy, Mines and Resources (Custodian) Environment
-------------------------	--

In the longer term — perhaps three to four years hence — the Report foresees a further consolidation of functional centres. The list of such centres might, at that time, read as follows:

Direct-Service	Manpower and Immigration Unemployment Insurance Commission National Health and Welfare Veterans' Affairs Indian and Northern Affairs
----------------	--

Trade & Transportation	Transport Industry, Trade and Commerce Regional Economic Expansion Customs & Excise (Possible)
------------------------	---

Resources – Environment	Energy, Mines and Resources (Custodian) Environment Agriculture (Possible)
-------------------------	--

3. The establishment of six service-wide application centres, over a period of three or four years, is also provided for. These centres are listed below. The name of the custodian department for each centre appears in parentheses after the centre's name.

Library and Information Retrieval (National Library)
 Text Processing and Composition Services (DSS – Printing Operations)
 Personnel Management Information Systems (DSS-Services)
 Financial Administration Systems (DSS-Services)
 Scientific Computing (National Research Council)
 Inventory and Warehouse Management (DSS-Supply)

A seventh centre, in the area of econometrics and economic analysis, is still under study and may be recommended later.

4. The Report schedules only the first step in bringing the functional and service-wide application centres into existence, i.e., the presentation by each centre's management of a detailed plan for the centre's implementation. The dates on which these plans are to be ready are all in the financial year 1973/74, except in the case of the Inventory centre, which is scheduled to present its plan in 1974/75.
5. The restructuring outlined above makes provision for the departments which are now very large users of electronic data processing. It leaves undisturbed the relations which the smaller EDP users among the departments have built up with private-sector service bureaux. In a very few isolated cases, where a department appears to be operating equipment of less than economic size, special studies will be conducted.
6. In anticipation of the guidelines which are to be prepared as part of the implementation of the Plan, the Report outlines the institutional framework on which the restructuring will rest. This outline will, in due course, be filled out as the guidelines are published. The outline covers the areas of organization and staffing, financial administration and personnel.
7. With respect to organization and staffing, the Report recommends the widest possible latitude and discretion be given to the management of the EDP centres. Only a basic structure of external relationships is proposed to provide a minimum of uniformity in the way in which centres deal with their users and with central agencies. Since the Report emphasizes that functional and service-wide application centres must be able to offer competitive services at competitive prices, and must break even financially, it recognizes that some of the non-economic constraints now imposed in the areas of organization and staffing need to be removed.

APPENDIX I-2

8. In the area of financial administration, the principle of full visibility of true costs of EDP operations is reaffirmed. The Report calls for full recovery of the costs of these operations from the user, but, pending the preparation of a guideline on financial administration, leaves the question of choice of method of funding open. It also calls for the development of guidelines for costing which would permit comparisons among centres and with the private sector.
9. The Report also recommends that the Personnel Policy Branch of the Treasury Board Secretariat prepare a plan for the review of personnel and classification practices relating to EDP staff. This work should be carried out in co-operation with the staff of the Information Systems Division.

Implementation

10. Guidelines covering the major areas in the EDP field are being prepared by the staff of the Information Systems Division in collaboration with departments. Among the topics to be covered are:
 - (1) Roles and Responsibilities of organizations concerned with administration of EDP.
 - (2) Choice of EDP Services.
 - (3) Planning for EDP.
 - (4) Implementation and Control of Projects.
 - (5) Financial Administration for EDP Centres.
 - (6) Performance Measurement.
 - (7) Procurement of EDP Goods and Services.
 - (8) EDP Standards.
 - (9) Computers and Privacy.
 - (10) EDP Security.
 - (11) EDP Information Gathering and Dissemination.
 - (12) EDP Records Management.
11. The EDP Master Plan will be revised annually by the Information Systems Division to reflect current departmental and centre plans; each such revision will cover the five-year period beginning at the date on which the revision is made. Equipment, money and personnel requirements for the first two or three years of the five-year cycle will be fairly firmly predicted, on the assumption of no radical changes of policies or programs. The longer-term needs will be projected on the basis of existing or anticipated rates of growth.

12. For departments operating departmental centres, the principal impact of the new arrangements will probably lie in the area of planning and budgeting. Such departments must expect increased insistence by the Treasury Board that stated EDP needs be related to major departmental programs, and that the EDP component in each program be clearly identified. To achieve these ends, some departments may find it necessary to modify existing practices in the area of financial administration. The nature of such modifications is being left to the discretion of departments, subject, of course, to the general direction of policies and guidelines.
13. With respect to functional centres and service-wide application centres, the immediate task is to bring into existence enough organizational structure to get the detailed planning of each centre under way. To that end, the Treasury Board Secretariat will:
 - (a) request departments to nominate representatives to the Advisory Boards and Advisory Committees in which they will be participating,
 - (b) designate its own representatives to the Advisory Boards and Committees,
 - (c) schedule the first meeting of the Boards and Committees.
14. The Advisory Committee of a Service-Wide Application Centre will at its first meeting consider the proposals of the Custodian department for selection of a Centre Director and an implementation task force to prepare detailed implementation plans. In some cases, no immediate appointment of a Centre Director will be required.

With the completion and approval of the EDP Master Plan Report, the development of government EDP policy and planning enters a new phase, one in which departments will play a major role. This is especially true since the Master Plan generally indicates broad directions without detailed implementation plans. While the Treasury Board Secretariat is endeavouring to provide departments with as much assistance as possible both by the development of guidelines and through individual discussions, a substantial burden of implementation falls to the departments concerned. I look forward with confidence to your co-operation.

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ROLES AND RESPONSIBILITIES

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A. INTRODUCTION

This chapter, which is intended to serve as a quick reference for government personnel, attempts to identify the most important interrelationships and responsibilities of those government organizations specifically concerned with the administration, co-ordination and use of EDP within the federal government. In-depth information on any of the organizations should be obtained by reference to a more detailed subject chapter within the guidelines or by direct contact with the organization.

B. DEPARTMENTS AND AGENCIES AS USERS OF EDP

As users of EDP, departments and agencies are responsible for using EDP in support of departmental programs in an effective and efficient manner. Any EDP activity must be carried out in accordance with approved policies and regulations promulgated by the Treasury Board Secretariat.

Departments and agencies have the following specific responsibilities:

- preparing EDP plans containing information on on-going applications, existing and proposed projects, equipment requirements and personnel needs in accordance with Chapter III (Planning for EDP Needs),
- examining and choosing the best sources of EDP facilities and services in terms of levels of service and costs, from departmental centres, functional centres, service-wide application centres and private sector computer service organizations in accordance with Chapter V (Choice of EDP Services) and Chapter VI (Procurement of EDP Goods and Services),
- maintaining effective liaison with the Treasury Board Secretariat's Information Systems Division on EDP developments and plans,
- consulting and working with appropriate organizations in the planning and operation of EDP systems, including the Department of Supply and Services, the Government Telecommunications Agency, Statistics Canada and the Public Archives,
- preparing submissions to the Treasury Board for approval in those cases identified in Chapters III, V, VI and VII,
- participating in and providing representatives for the committees involved in the management and operation of the government's various EDP centres.

Some departments find it convenient to nominate an EDP adviser or coordinator (or more than one) within the department. The individual or individuals so appointed act as the primary point of contact in dealing with the Information Systems Division of the Treasury Board Secretariat and the Department of Supply and Services, as well as co-ordinating the EDP activities in the

department. The adviser may also be called upon to represent the department on some or all of the EDP centre advisory committees of which the department is a member. This function is discussed in more detail in Chapter III.

C. GOVERNMENT EDP CENTRES

The following information is provided as a generalized descriptive framework of the three types of government EDP centres: departmental, functional and service-wide application centres. The actual creation, internal structure and operation of any one centre may vary from the concepts stated in this section.

In general, the overall management structure of each new centre will be subject to the mutual agreement of the participating departments and the Treasury Board Secretariat, and will be tailored to meet the particular environment in which the centre operates. The following descriptions are for general guidance only. A list of centres designated in the EDP Master Plan is provided in Appendix II-1.

1. Departmental Centres

a. Definition

A departmental centre is defined as one or more EDP installations located in a single department and used primarily to provide services for dedicated systems in support of departmental programs.

b. Centre director

The centre director should be responsible for the organization, management and effective operation of the centre. This normally would include staffing, planning, financial management, performance measurement, and liaison and co-ordination with other organizations, depending on the requirements of both users and the custodian department.

2. Functional Centres

a. Definition

Functional centres are created to serve the EDP needs of major programs of a number of specified departments which have related requirements for information, expertise, and/or service.

b. Policy advisory board

The members of this board should normally be drawn from the senior management level of the participating departments and should include a representative of the Information Systems Division of the Treasury Board Secretariat. The centre director will usually be a non-voting member. The board might be presided over in rotation by the user representatives.

The deputy head of the custodian department must ensure that a functional centre operates in accordance with the functional direction of the policy advisory board. The board will provide direction on such matters as the content of program forecast and estimates submissions on behalf of the centre, the establishment of new partnerships or types of service, applications for exclusion

of projects or complete withdrawal from the centre or for the inclusion of new partners, establishment of priority guidelines, financial or operational reviews of the centre, and the appointment of the centre director. In the event of irresolvable conflict between the responsible custodian and user departments, the procedures of Chapter V for altering functional centre alignments would apply.

c. Centre management advisory group

The members of this group would normally be the centre director and the EDP advisers or directors of data processing (or planning) in the user departments. The group would be headed by the centre director. A representative from the Information Systems Division of the Treasury Board Secretariat should be a full member of the group in the initial stages of the centre's development and should participate in its meetings as required thereafter.

The centre management advisory group would act as a steering committee for the centre in such matters as changes in hardware or software, changes in price structure, review of standards, macro-scheduling of projects or equipment, appointment of senior staff, planning, and resolution of complaints. It would also provide technical support to the policy advisory board.

d. Centre director

The centre director should be responsible for the overall organization, management and effective operation of the centre. He would normally be the chairman of the centre management advisory group and a non-voting member of the policy advisory board.

e. Custodian department

Although the deputy head of the custodian department must bear ultimate responsibility for the good management of the centre, it is absolutely essential that he be guided by the policy advisory board, particularly in matters which directly affect opposing interests of member departments. The custodian department provides administrative support (personnel and financial services, physical facilities, etc.) for the centre. In the early stages of development, it may also provide operating funds through main estimates until the centre is financially independent. The custodian department will, of course, recover the costs of services provided to the centre from its users.

3. Service-Wide Application Centres

a. Definition

Service-wide application centres have been defined as centres of EDP expertise in some specialized aspect of computing, created to service identifiable government-wide processing systems in support of programs in those departments and agencies that require that kind of service. These centres would be responsible for surveying the area in question, assisting users in long-range planning, advising Treasury Board staff, and, in some cases, operating facilities.

b. Policy advisory committee

This committee should normally include members from the senior management level of the major user departments, the assistant deputy minister responsible for the centre in the custodian department, and a representative of the Treasury Board Secretariat. The composition of the first advisory committee for each centre would be determined by the Information Systems Division through consultation with user departments and the custodian. As time progresses membership in the committee should be rotated among all user departments. The chairman of the committee should be chosen by its members. The centre director should be a non-voting member.

The policy advisory committee of a service-wide application centre would provide, at a senior level, advice and guidance to the centre on such matters as long-range planning, organizational changes and market analysis.

c. Users' group

This group would include the centre director, technically-oriented personnel from user departments and a representative from the Information Systems Division. It would provide a forum for information exchange among users and the centre. Such information would encompass technical matters, services provided and planned either internally or in the private sector, service problems or improvements, and other such matters. The terms of reference of the group will be defined in more detail for each area and reviewed by the policy advisory committee. The formation of the users' group is the responsibility of the centre.

d. Centre director

The centre director should be responsible for the overall organization, management and effective operation of the centre. He would normally be a member of the users' group as well as the policy advisory committee.

e. Custodian department

The role of the custodian department in service-wide application centres will depend on the precise nature of the centre. Some centres may develop in a co-ordination role; others may offer specific systems services. Initially the custodian department will function as the focus for the planning of the centre and its activities.

D. SPECIAL DEPARTMENTAL ROLES

1. Department of Supply and Services — Services

Through its Bureau of Management Consulting, the Services Administration of the Department of Supply and Services offers a wide range of consulting services to all departments on a request basis. In the EDP area, assistance is available on such aspects as EDP planning, project definition and selection, systems design and implementation, monitoring activities, and pre- and post-implementation audit. In the more general area of management, expertise is available in such fields as organization analysis, methods and procedures analysis and general survey work.

2. Department of Supply and Services — Supply

The Supply Administration of the Department of Supply and Services is charged with the provision of an efficient and effective procurement service for EDP goods and services for departments and agencies. The department's primary responsibilities are elaborated in Chapter VI (Procurement of EDP Goods and Services). The EDP Branch is the organization that handles EDP acquisitions.

The Security Services Branch is responsible for the personnel security clearance of all industries or firms on contract to the government.

3. Department of Industry, Trade and Commerce

The Department of Industry, Trade and Commerce, in conjunction with other departments as appropriate, is responsible for the preparation of the government's policies and plans for the development of the computer industry in Canada. Such policies and plans can have an effect on major EDP procurements and in turn the implementation of government industrial policy can be furthered by government procurement practices. (A mechanism to co-ordinate the use of procurement to help achieve social and economic objectives is under consideration).

4. Government Telecommunications Agency, Department of Communications

The Government Telecommunications Agency is responsible for the planning for and co-ordination of telecommunications facilities. The Agency is prepared to provide advice and technical assistance to any department with respect to the planning, acquisition and performance monitoring of telecommunications equipment and services, as outlined in Chapter VI.

5. Public Archives

The Public Archives is responsible for fostering the good management of public records, including those produced by EDP, in such areas as scheduling, maintenance, and retention, and for maintaining records designated for archival retention. The Archives also can provide advice and technical assistance to departments on the procurement and use of microfilm services and equipment, as outlined in Chapter VI.

6. Statistics Canada

Statistics Canada has a statutory responsibility to collaborate with departments of government in the collection, compilation and publication of statistical information, including statistics derived from the activities of those departments. It is also responsible for promoting the avoidance of duplication in the information collected by departments. These two responsibilities indicate the need for Statistics Canada's involvement in the planning, creation and operation of the administrative records systems of departments whenever these systems might be a useful part of the national statistical data base, subject to confidentiality requirements and other relevant constraints. In addition, Statistics Canada is required to review departmental plans for surveys directed to more than 10 respondents.

E. INTERDEPARTMENTAL ORGANIZATIONS

1. EDP Advisory Committee

The primary responsibilities of the committee are to review and advise on EDP policy and guidelines, as well as amendments to existing Treasury Board policies and guidelines, thereby ensuring that common departmental concerns are taken into account, and to advise on the impact of the Information Systems Division's actions and proposals on the government's EDP community. This committee meets at least twice annually or more often as required. Members of the committee are senior officials drawn from approximately 20 departments directly or indirectly involved in the use and/or provision of EDP facilities and services (see Appendix II-2).

2. EDP Security Evaluation and Inspection Team

The EDP Security Evaluation and Inspection Team is organized and operated by the Commissioner, RCMP Police. The Team will inspect EDP facilities within the government service and private sector facilities processing government information, and provide a security evaluation report and recommendations. Requests for the services of the Team should normally be made through the Departmental Security Officer.

3. Government EDP Standards Committee

The Government EDP Standards Committee includes the heads of all EDP centres and designated common-service EDP staffs as well as departmental representatives and individual members. This Committee is responsible for approving all EDP standards recommended for general federal government use, and for co-ordinating the work of federal government officers in national or international agencies concerned with EDP standards.

4. Interdepartmental Advisory Committee on Computer/Communications

This interdepartmental committee is primarily concerned with national policy matters related to computer/communications. To support its work there is a small secretariat, whose director is the chairman of the interdepartmental committee, located in the Department of Communications.

F. DATA PROCESSING INSTITUTE OF THE FEDERAL INSTITUTE OF MANAGEMENT

The Data Processing Institute is one of several professional bodies which form a part of the Federal Institute of Management. The objective of the Institute is to promote the development and utilization of efficient data processing and information handling practices for the benefit of the federal government and the Canadian people. General membership is open to personnel in any department or agency of the Canadian government who are directly concerned with the operation or management of data processing equipment or interested in the application and improvement of data processing techniques.

G. CENTRAL AGENCIES

1. Public Service Commission

The Public Service Commission is responsible for developing and periodically revising EDP personnel selection standards, and assisting departments in the recruitment and selection of personnel. The Commission also co-ordinates training courses on EDP topics for EDP practitioners and more generally for administrative and management personnel.

2. Treasury Board Secretariat

a. Information Systems Division, Administrative Policy Branch

The Information Systems Division is responsible for developing, revising and interpreting policies and guidelines for EDP planning, procurement, operations and evaluation, and for reviewing and recommending action on departmental and centre plans for EDP developments, operations and acquisitions, and on any submissions relating to these plans. The division also monitors the progress of government EDP, including participation in reviews of selected projects, and assessments of the level of service of particular operations, and ensures the sharing of information relating to EDP within the federal public service. The division is responsible for producing an annual review of EDP in the federal government.

b. Program Branch

Based on the analysis of departmental plans and programs, the Program Branch recommends to the Treasury Board the acceptance or modification of specific resource allocation proposals. The Program Branch will normally obtain advice from the Information Systems Division on the EDP content of proposals and submissions in support of departmental programs, and provides assistance to the Information Systems Division in its EDP planning and review activities.

c. Personnel Policy Branch

The Personnel Policy Branch is responsible for the development and interpretation of occupational group definitions, classification standards and pay structures that apply to EDP personnel; and negotiation of collective agreements with the representatives of unions that bargain for EDP personnel.

GUIDE ON EDP ADMINISTRATION

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APPENDIX II-1

EDP CENTRES DESIGNATED IN THE EDP MASTER PLAN

A. DEPARTMENTAL CENTRES

1. Department of the Environment — Atmospheric Environment Service
2. Department of National Defence
3. National Research Council — Communications Branch
4. National Revenue — Taxation
5. Royal Canadian Mounted Police
6. Statistics Canada
7. Department of Supply and Services — Services Administration
8. Department of Supply and Services — Printing Operations

FUNCTIONAL CENTRES

1. Direct-Service I
 - Unemployment Insurance (Custodian)
 - Manpower and Immigration
2. Direct-Service II
 - National Health and Welfare
 - Veterans Affairs
 - (supported by DSS-Services)
3. Revenue Collection
 - National Revenue — Taxation (Custodian)
 - National Revenue — Customs and Excise
4. Trade and Transportation
 - Transport (Custodian)
 - Industry, Trade and Commerce
 - Regional Economic Expansion
5. Resources-Environment
 - Energy, Mines and Resources (Custodian)
 - Environment

APPENDIX II-1

C. SERVICE-WIDE APPLICATION CENTRES

1. Library and Information Retrieval (Custodian: National Library)
2. Text Processing and Composition Services (Custodian: Printing Operations)
3. Personnel Management Information Systems (Custodian: DSS-Services)
4. Financial Administration Systems (Custodian: DSS-Services)
5. Scientific Computing (Custodian: National Research Council)
6. Inventory and Warehouse Management (Custodian: DSS-Supply)

The departmental centres are all in existence, though their specific organizational boundaries are still being defined. The functional and service-wide application centres are in various stages of organization. The feasibility of establishing an additional SWAC (Econometrics and Economic Analysis) is under review.

**DEPARTMENTS AND AGENCIES REPRESENTED
ON THE EDP ADVISORY COMMITTEE**

- Department of Agriculture
Department of Communications
Department of Energy, Mines and Resources
Department of the Environment
Department of Industry, Trade and Commerce
- Interdepartmental Committee on Computer/Communications
Department of Manpower and Immigration
Department of National Defence
Department of National Health and Welfare
National Research Council
- Department of National Revenue — Customs and Excise
Department of National Revenue — Taxation
Public Archives
Public Service Commission
Statistics Canada
- Department of Supply and Services — Services
Department of Supply and Services — Supply
Treasury Board Secretariat
Unemployment Insurance Commission

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PLANNING FOR EDP NEEDS

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DIRECTIVES

- 1.1 Each department and agency, and each EDP centre or large common-service EDP staff designated by the Treasury Board Secretariat, shall provide the Treasury Board with an Annual EDP Report and Plan in the month of September in the detail and form specified and periodically revised by the Secretariat in consultation with the EDP Advisory Committee.
- 1.2 The Treasury Board Secretariat shall review annual EDP reports and plans, recommend, as appropriate, approval in principle of acquisitions for which funds have been allocated and of proposed price schedules, and identify projects with which it wishes to maintain continuing liaison. The Information Systems Division of the Secretariat shall update the EDP Master Plan and produce an annual review of EDP in the federal government based on the information contained in the annual EDP reports and plans.
- 1.3 The approval of EDP plans by the Treasury Board will be sufficient authorization for departments and agencies to implement these plans, and acquire the goods and services specified therein for which funds have been allocated, unless:
 - (a) contract approval is specifically required in the "Policy and Guidelines on Contracting in the Government of Canada", or in the "Government Contracts Regulations", or
 - (b) submissions are specifically required by the Treasury Board as provided in directives 3.4, 4.1, 4.2 and 5.4, and guideline 5.13 of this Guide.

GUIDELINES

- 1.4 Each deputy head should designate one or more EDP adviser(s) or co-ordinator(s) to act as the focal point(s) through which departmental users are represented in the planning, acquisition, monitoring and audit of an effective EDP service, whether the service is obtained from government resources or from the private sector.
- 1.5 Annual EDP reports and plans should be approved by the responsible deputy head and, in the case of functional centres or service-wide application centres, should receive the concurrence of the policy advisory board or committee of the centre, before submission to the Treasury Board.
- 1.6 Departments, agencies and EDP centres should notify the Information Systems Division of the Secretariat by memorandum as early as possible whenever significant changes in approved plans are necessary or considered likely to be desirable.

- 1.7 Departments, agencies and EDP centres should use their EDP plans as one basis for monitoring EDP projects and EDP services received or provided. The Information Systems Division of the Secretariat should monitor the general conformance of EDP performance to EDP plans, and should participate in monitoring projects identified in the approval of EDP plans as of continuing interest or special importance.

A. INTRODUCTION

"It is not known how effectively or efficiently the EDP function is contributing to government programs. There is insufficient attention being given to the overall planning of EDP projects in support of departmental programs, and too little evaluation of the effectiveness of projects once operational. There are overlapping projects being developed independently in several departments."¹

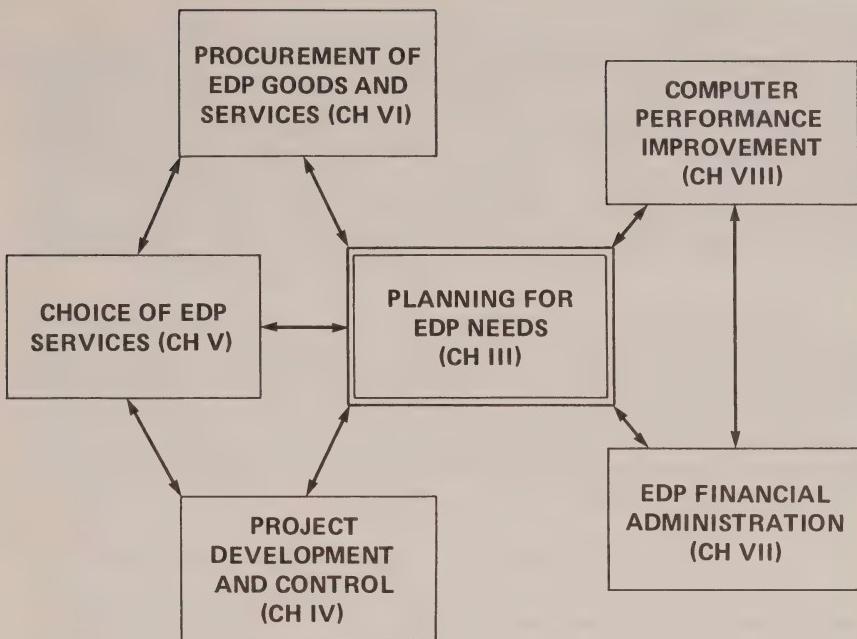
The planning mechanism and documents described in this chapter are intended to remedy this situation by:

- ensuring that adequate plans are prepared and communicated to all parties concerned;
- providing a basis for performance evaluation;
- helping to identify cases where scarce resources might be wasted in needless duplication of activities;
- helping to ensure that an adequate supply of EDP resources will be available to support all approved programs.

Plans for the future are intended primarily to assist management in making better current decisions. The Treasury Board Secretariat does not expect rigid adherence to plans, but will attempt to help departments when substantial changes in plans become necessary, as well as to anticipate problems which may arise in implementing current plans. It is nevertheless true that EDP plans provide, in most instances, the most reasonable basis for evaluation of performance. Without an evaluation based on plans, the benefits of experience are likely to be largely wasted, and the incentive for careful and prudent planning is diluted.

Planning must be conducted at three levels: the level of the individual project, the level of departmental or EDP centre management, and the total government level. The Policy Project report, the EDP Master Plan, and this Guide present some results of planning at the total government level. This chapter, and portions of other chapters, outline information requirements basic to total government EDP planning and indicate the sort of EDP plans required of departmental and EDP centre management. Individual project planning is the special concern of Chapter IV, but is also touched on elsewhere in this Guide. The main interrelationships of the various chapters concerned with planning are shown in the following chart:

1. *Report on Electronic Data Processing in the Federal Government of Canada*, Treasury Board Secretariat, Nov. 30, 1971, p. 5.



This chapter provides a brief overview of the EDP planning process and its relationship to the Planning, Programming, and Budgeting cycle described in the "Program Forecast and Estimates Manual". It outlines the planning information requirements of the Treasury Board Secretariat, and the responsibilities of departments, EDP centres and the Secretariat in this cycle. It describes briefly the nature and use of the information flows which will permit the Information Systems Division of the Secretariat to recommend approval in principle of the goods and services specified in EDP plans, and to assist in the appraisal of EDP-related activities. Appendices specify the contents of annual EDP reports and plans, and list the EDP centres and common service EDP staffs required to report as EDP centres.

It should be remembered that the terms "approval in principle" or "approval", as used in this Guide, mean authority to proceed with an EDP project. They do not imply an allocation of the funds required for a given project, such allocation being made only by the actual inclusion of, or a specific commitment by the Treasury Board to include, the necessary funds in Main or Supplementary Estimates, or by the specific allotment or transfer of already appropriated funds from another project. The approval does not provide authority to enter into a contract; such authority is governed by the "Policy and Guidelines on Contracting in the Government of Canada" and the "Government Contracts Regulations". In addition, EDP capital projects may require the same approval as other capital projects, in accordance with Circular No. 1970-5 (TB 692776).

B. OVERVIEW

Project plans for EDP use should specify the amount of each type of EDP resource likely to be required in support of the project, and the time at which these resources are likely to be required. In formulating project plans, EDP users should have access to EDP expertise to ensure that their plans are consistent with the "state of the art", that they are aware of any likely problems in acquiring needed resources, and that their project plan makes adequate allowance for necessary tasks. The checklists in Chapter IV indicate factors which may have to be considered in planning the EDP aspects of a project.

Project planning must be an iterative process. The EDP plans formulated at the early stages of a project will inevitably require modification as the project proceeds through the analysis and design stages, and perhaps even while the design is being developed and programmed (although a "system freeze" is usually desirable after design approval). It is important to update plans as successive stages are reached, and to ensure that all concerned are aware of any changes in likely resource requirements.

Departmental plans for EDP use should specify the total amount of each type of EDP resource likely to be required to support departmental programs, and the time at which these resources are likely to be required. They must be more than a compendium of project plans; they must make allowance for small projects and maintenance requirements which have not yet become visible in user areas as well as for individual project plans and for the likelihood that all individual project plans will in fact be realized. They should also take into account any supply problems, scarcity problems, etc., likely to affect the department's ability to acquire the indicated level of resources, and consider possible alternative sources of supply. The task of producing an integrated EDP plan at the departmental level will again require a significant input of EDP expertise.

EDP centre managers must rely heavily on departmental EDP plans as a basis for formulating their own plans for provision of services. Project and departmental planners should ensure that their likely demands on particular centres for particular EDP services are made known to those centres at the earliest possible date. EDP centre managers should not expect such demand forecasts to be absolutely accurate; like departmental planners they will have to judge the likelihood of full development of indicated demands. They will also have to keep in touch with the development of customer demands throughout the year, and make contingency allowances adequate to meet customer needs.

The Secretariat requires one basic flow of information from the departmental and EDP centre planning process: the EDP Annual Report and Plan specified in directive 1.1. This report and some supplementary information flows are described in part E of this chapter. At this point it is sufficient to note that the report should be designed to provide senior *departmental* management with sufficient information to appraise the state of EDP in the department, and provide a background for management decisions throughout the coming year, as well as to meet requirements of the Secretariat.

Separate annual EDP reports and plans should be submitted by designated EDP centres. EDP centre management should not be required to merge their data and information with other departmental activities, even with those also concerned with the provision of EDP services. Centre management should report specifically on the operations of their centre. This is necessary to achieve the visibility of centre activities required by EDP policy, and desirable to help ensure that centres are financially viable in appropriate circumstances. In the case of functional centres and SWACs, these reports should be approved by the Policy Advisory Board or Committee of the centre before they are approved by the deputy head of the custodian department.

The Information Systems Division of the Secretariat will review these reports as a basis for recommending approval in principle of necessary procurements and assisting in the appraisal of EDP-related activities. It will try to determine the total demand for each type of EDP resource, and endeavour to ensure that adequate resources are available to best meet total EDP requirements, including a necessary contingency allowance. The ISD will also produce an annual review of EDP in the federal government, including an updating of the EDP Master Plan, which will provide an overall planning framework in which future project, departmental and centre plans can be cast.

From time to time departments will be faced with situations requiring that a resource allocation submission be made to the Treasury Board on a proposal that was not reflected in the Annual EDP Report. Such submissions should be made in accordance with the instructions in the "Program Forecast and Estimates Manual." If such situations involve significant changes in the planned use of EDP, the changes in EDP plans should be set forth in the accompanying documentation. Departments should also ensure that any EDP centres or service units which may have to respond to such changes in plans are notified at the earliest possible moment, and that DSS is notified of any special needs which they may have to meet.

The following chart on the Government Planning and Budgeting Cycle identifies the relationships between the planning information requested on EDP and the time-frame for overall government planning activities.

GOVERNMENT PLANNING AND BUDGETING CYCLE

EVENT (*indicate EDP- related events)					FISCAL YEAR												
	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M
Departments plan program forecast					—												
Departments submit program forecast to Program Branch						—											
Program Branch reviews program forecasts							—										
TB/Cabinet review "A" and "B" budgets								—									
TB issues budget guidelines for main estimates (target figures)										—							
*Departments and centres prepare annual EDP reports and plans						—	—	—	—	—	—						
*Departments and centres submit annual EDP reports and plans										—	—						
TB calls for main estimates										—							
TB calls for supplementary estimates										—							
Departments submit main estimates to Program Branch										—							
*ISD prepares annual review of EDP in the federal government										—	—						
Departments submit supplementary estimates to Program Branch										—							
TB reviews main estimates										—	—						
Cabinet reviews main estimates										—	—						
Tabling of main estimates												—					

The planning framework for EDP outlined above can facilitate but cannot ensure good planning. For the EDP planning process to work effectively, it is important that all those involved understand the purposes served by the information which they supply. This understanding will indicate the effort which they can usefully expend in information gathering and planning, and the caveats which they should attach to their planning output before passing it to the next planning level. It will also confirm the importance of keeping agencies on which they must depend for service — EDP centres, DSS and others — apprised of their plans and of changes in those plans in order to permit those agencies to plan to meet customer needs.

C. THE DEPARTMENTAL EDP ADVISER

It is recommended that each deputy head designate one or more EDP advisers or co-ordinators to act as focal points for EDP planning, and for representation of departmental users in the acquisition, monitoring and audit of an effective EDP service. Many line managers are not familiar with the technicalities of EDP, and many promoters and salesmen of EDP technology, services and equipment present their concepts and products without real knowledge of the manager's problem. These factors have combined to produce many EDP disappointments in both public and private sectors. In addition, many users will require expert advice and guidance if they are to be able to consider adequately the numerous alternative private and public sources of EDP services.

The principal responsibilities of an EDP adviser or co-ordinator should include:

- preparing departmental plans for the rationalization of EDP use within the department, and co-operating with the Information Systems Division of the Secretariat in integrating these plans with the EDP Master Plan,
- preparing the departmental annual EDP report and plan, and any memoranda of notice or Treasury Board submissions necessary to supplement this document,
- ensuring that EDP centres falling within the authority of the department prepare annual EDP reports and plans and other reports required by departmental management or central agencies,
- consulting and working closely with departmental users of EDP services, potential suppliers and DSS to ensure an effective exchange of information in identifying needs and choosing EDP services,
- acting as an initial point of contact with DSS when acquisition of EDP goods or services by users is contemplated, though not to the exclusion of direct contact between DSS and the user,
- evaluating the cost and quality of EDP service supplied to departmental users by each EDP service point,

- consolidating information on EDP use for the guidance of departmental staffs, and exchanging information and experience with other departments and central agencies,
- preparing departmental directives or guidelines on EDP use within the framework of Treasury Board directives and guidelines,
- advising departmental program managers on the planning and implementation of projects in which there is a substantial EDP content.

Most of the above functions are already performed within EDP-using agencies, although they may be divided among several individuals. Their consolidation is likely to minimize the total man-hours consumed in their performance. If these functions are combined, due consideration should be given to potential conflicts of interest which would exist if they were assigned to the same persons responsible for the provision of substantial EDP services (systems, programming, machine or other). Such a combination of functions could limit the alternatives considered in planning, and could seriously compromise the representation of user interests in the choice and evaluation of EDP services.

D. RESPONSIBILITIES

In a co-operative process like government EDP planning, it is important that all parties understand their respective responsibilities. This section summarizes the primary responsibilities of departments, EDP centres and the Treasury Board Secretariat in EDP planning.

1. Departments and Agencies

- to plan the EDP support required by departmental programs, and the total level of EDP support required by the total departmental program,
- to consult and work closely with EDP centres and other suppliers of EDP services to ensure an effective exchange of information on EDP requirements,
- to prepare an annual EDP report and plan which identifies the past and planned use of EDP resources in the context of total project or program sub-activity costs,
- to review performance against plans, and assess the effectiveness and efficiency with which EDP resources are used in support of departmental programs,
- to provide the Information System Division, Treasury Board Secretariat, with advance information regarding major changes being contemplated in the use of EDP resources,
- to prepare and make EDP submissions in those circumstances specified in this Guide.

2. EDP Centres and Designated Common-Service EDP Staffs

- to plan the provision of services likely to be required to meet the needs of user programs and projects,
- to consult and work closely with clients to ensure that centre resources are matched as closely as possible to requirements,
- to prepare an annual EDP report and plan which identifies the past and planned costs required to meet the needs of centre users, the actual or pseudo revenues earned or expected, and the past and expected users of centre resources,
- to review performance against plans, and assess the program and cost effectiveness and technical efficiency of services supplied,
- to provide the Information Systems Division, Treasury Board Secretariat, with advance information regarding major changes being contemplated in the provision of EDP services,
- to prepare EDP submissions in those circumstances specified in this Guide.

3. Treasury Board Secretariat

- to review the annual EDP reports and plans submitted by departments and EDP centres, advise on the efficacy of proposed EDP expenditures in relation to departmental programs, and indicate instances where further action is required (e.g. additional Treasury Board submissions or Secretariat participation in reviews of particular projects),
- to update annually the Master Plan for EDP use in the federal government service, and prepare an annual review of federal government use of EDP.
- to review and recommend action on EDP submissions to the Treasury Board,
- to review overall government use of EDP against approved plans, monitor the efficiency and effectiveness with which EDP services are provided by government resources, and participate in the review of selected EDP projects.

E. INFORMATION FLOWS AND THEIR USES

1. The Information Systems Division (ISD)

The report of the EDP Policy Project recognized that EDP technology was still in a state of rapid change, and that this change would inevitably affect the policies which should govern EDP use and the ways in which EDP could appropriately be applied in the service of government programs. It therefore recom-

mended the establishment of an Information Systems Division in the Treasury Board Secretariat to monitor the application, effectiveness and appropriateness of EDP policy, develop and keep up to date directives and guidelines relating to EDP, and provide a focus for the planning and co-ordination of government EDP activities. The division was also charged with gathering and disseminating information relating to EDP in the government.

The role of the ISD was visualized more as a catalyst than as a regulatory mechanism. Although the division is responsible for processing submissions to the Treasury Board relating to EDP acquisitions, it was recognized from the outset that a substantial reduction in requirements for submissions was essential if both departmental and Secretariat officers were to be able to give proper attention to the planning, development and evaluation problems identified by the EDP Policy Project.¹ It is for this reason that this Guide provides for approval in principle of most EDP acquisitions through the annual EDP report and plan, subject to the safeguard provided by the procurement memorandum procedure.

The ISD has organized its staff into two functional groups, insofar as EDP is concerned. The first is concerned primarily with departmental liaison and with encouraging the development of the EDP centres specified in the EDP Master Plan. The second is concerned primarily with guideline development, interpretation and evaluation, information co-ordination and dissemination, and the updating of the EDP Master Plan. Both groups are dependent on an adequate flow of information from departments, EDP centres and designated common-service staffs as a basis for their work.

2. Information Flows

There are three primary sources of the information required by the ISD: the informal contacts developed by the liaison group, the reports and memoranda specified in this Guide, and operational records maintained by other departments (such as the inventory and contract records being developed by DSS). Information will also be acquired through participation in the work of various committees and task forces, and from the Program Branch of the Secretariat.

The reports and memoranda specified in this Guide fall into three groups, each meeting specific apparent needs. It will be recognized that perception of these needs may well be defective until some experience has been gained with application and administration of the approved EDP policy. What follows should be regarded as an interim statement based on present perceptions.

1. *Report*, op. cit. p. 16.

a. Annual EDP report and plan

These reports are described in Appendix III-1. They will be the basic source of information about the overall state of EDP in the government. They will provide data on EDP costs and expenditures in the perspective of the total costs (excluding transfer payments) of the departmental projects served by EDP. They will also outline the plans of departments and agencies, and of their centres and common-service staffs, for future use of EDP and for the development of in-house or external sources of supply. In addition, they will provide a vehicle for the approval in principle by the Treasury Board of planned EDP acquisitions, which is expected to reduce very greatly the number of submissions relating to EDP which departments would have had to prepare under earlier conditions.

These reports are to be received by the Treasury Board Secretariat by September 30 of each fiscal year. This date was selected to permit departments and reporting agencies to adjust their plans to be compatible with the budget guidelines resulting from the program forecast review, while still permitting the ISD to revise the EDP Master Plan in time for it to be useful input into the next program forecast cycle.

Separate annual reports are required from departments and from EDP centres and designated common-service EDP staffs. It is believed that this will permit an appropriate emphasis on demand problems in departmental reports and on supply problems in EDP centre and common-service staff reports, which will ensure that both are fully considered in Master Plan revisions. The existence of separate reports for EDP centres and designated common-service staffs will also help both departmental and central agency management to monitor the principal in-government EDP supply activities.

b. Quarterly financial and computer performance reports

These reports are described in Appendices VII-4 and VIII-3. At this time they are required only from the EDP centres and designated common-service EDP staffs specified in Appendix III-2. Any additional EDP centres recognized in the EDP Master Plan will be added to this list as they come into being. Additional common-service EDP staffs may be designated each year when EDP plans are reviewed if warranted by an increase in size or by the planned rate or nature of development.

No quarterly reports are required from departments at this time, and computer performance reports are required only for large and medium-sized computers. While performance data on minicomputers might be useful input for the development of acquisition or operating advice, it seems unlikely that ISD will be able to contribute in this area in the near future. It is hoped that departments will nevertheless begin to develop some operations records for smaller machines, and will take the initiative in analysing their comparative performance, stability, etc., under different conditions and in relation to different applications.

These quarterly reports will provide current information on the conformity to plans of the major in-government EDP supply activities, and should help to identify supply-side problems as they emerge. They are expected to be of particular value to the departmental liaison group within ISD, and should be of assistance in identifying and promoting the effective use of surplus government EDP resources.

c. Procurement memoranda

These are described in Chapter VI, section C-2. The primary purpose of these memoranda is to protect the right of the Treasury Board to consider procurement questions at the time it is proposed to initiate action, but to do this in a manner which will minimize the likelihood that delays in consideration of procurements will disrupt departmental acquisition timetables. They will also provide useful confirmation of the development of EDP activities according to EDP plans, and input into the updating of these plans.

3. Information Uses

The various information flows outlined above have multiple uses, all directed towards the discharge of the policy formulation, monitoring, planning and reporting responsibilities with which the ISD is charged. Some principal components of this work will be supply-demand analysis, evaluation of centres, equipment and personnel, evaluation of the EDP environment, and planning and reporting.

a. Supply-demand analysis

The analysis of trends in the demand for EDP support and the supply of EDP services is basic to most other activities of the ISD. Some of the principal aspects of this work are expected to be:

- identification of trends in EDP cost, EDP resource use (including changes in the resource mix resulting from technology or cost), sources of supply, etc., as a basis for long-range planning,
- identification of requirements for classes of EDP resource, to help avoid both supply bottlenecks and the creation of unneeded facilities in the short and medium term,
- identification of common applications and data base interests, as a basis for defining functional or other centres and minimizing duplication of activity,
- identification of surplus capacity and possible matching demands, as a basis for promoting fuller use of government EDP facilities and staffs.

The first three of these will be based primarily on data contained in annual EDP reports and plans. The identification of surplus capacity will be primarily from quarterly reports and liaison activity, of matching demands from liaison activity and annual plans.

b. Evaluation of EDP centres, equipment and personnel

The reports required by various directives in this Guide are intended to encourage evaluation of EDP centres, equipment and personnel by EDP and departmental management, as well as to permit some evaluation by the ISD. The work of the ISD in this type of evaluation is likely to include:

- developing evaluation aids to assist EDP and departmental management in appraising their equipment, operations and staff,
- comparing the apparent cost effectiveness of different EDP centres with each other and with the private sector (there have been many assumptions about the results of such comparisons, but to date few facts have been available to validate these assumptions),
- comparing the reliability, effectiveness, machine overheads, etc. associated with particular computers in particular environments.

This work will all draw heavily on data contained in annual EDP reports, and the first and second tasks will also utilize the quarterly financial and computer performance reports.

c. Evaluation of the EDP environment

This covers the evaluation of EDP policy, of the directives and guidelines based on EDP policy, and of the technical and institutional factors which impact on the EDP environment. Is government EDP developing along the lines recommended in the EDP Policy Project report, and are the predicted benefits of the approved EDP policy being achieved? Are the components of EDP policy still relevant (including the directives and guidelines) or have they been outdated by technological change or other developments? This work will be based on the supply-demand analysis and the evaluation of centres, equipment and personnel outlined above, and on the observations on the environment made by departments and EDP centres in their annual reports.

d. Planning and reporting

The results of these studies and evaluations will be summarized in an annual "Review of EDP in the Federal Government", which will provide an updating of the EDP Master Plan as well as reporting on developments of the past fiscal year. The report will also consolidate for the government service as a whole the principal statistical and financial data relating to government EDP for feedback to departments and centres and for reporting to the government, parliament or the public as required, on the state of EDP in the federal government.

As well as providing a basis for ISD planning, evaluations and reporting efforts, it is hoped that the reports called for in this Guide will be useful to departmental and EDP management. The annual report in particular is intended to ensure that a once a year review of the EDP activities under his jurisdiction is available to each deputy head. EDP practitioners have frequently been "too busy" to report to management, or have tended to report in technical terms or

in terms of benefits about to be achieved. It is hoped that the reporting requirements of this Guide will have a positive influence on the type of report which EDP staffs make to their customers and their management within their departments, agencies and centres.

4. Updating of EDP Centre or Departmental Plans

If significant changes in departmental or EDP centre plans are made or are seriously contemplated, departments or centres should notify the Information Systems Division by memorandum as soon as possible. Plans should also be updated as specified in Chapter VI for changes in planned procurements, and as specified in Chapter VII for changes that affect a centre's costing and pricing mechanism. Early notice to ISD regarding changes in plans will help insure against undesirable delays to project schedules.

GUIDE ON EDP ADMINISTRATION

Chapter
III-1 and III-2
Date
August, 1974

APPENDIX III-1

INSTRUCTIONS FOR PREPARATION OF ANNUAL EDP REPORTS AND PLANS

Each department and agency, and each EDP centre and common-service EDP staff designated by the Treasury Board Secretariat, will provide the Information Systems Division of the Secretariat with an Annual EDP Report and Plan every September commencing in September, 1974. The EDP centres and designated common-service EDP staffs from which separate reports are required are listed in Appendix III-2.

Departmental annual EDP reports and plans should be primarily concerned with the use of EDP to support departmental projects and programs, the benefits achieved or likely to be achieved through EDP use, and the lessons learned about the use of EDP. They should also contain information on those EDP services provided from departmental resources other than resources organized in EDP centres or designated common-service EDP staffs.

Annual EDP reports and plans submitted by EDP centres and designated common-service EDP staffs should be primarily concerned with the production and supply of EDP services to users and the cost of providing these services.

Both sets of reports should contain text and tables. The text should provide an explanation of performance and plans, and an appraisal of the EDP environment. The tables should illustrate the text and provide necessary inputs for the aggregation and planning of the total government use and cost of EDP. Text and tables should also provide a basis for necessary Treasury Board approvals in principle of EDP plans and planned acquisitions of EDP resources.

The text section of the two sets of reports should be organized as and include the material specified in the following outline:

APPENDIX III-1

Departmental Report

1. Executive Summary

2. Past Year Report

- a review of major uses of EDP, emphasizing significant new developments and the benefits achieved through EDP use, and setting the past year in perspective of previous years and plans for the future;
- a review of the principal departures during the past year from previous plans for EDP use, and any implications for future planning or EDP use.
- a certification that the DSS inventory of EDP equipment held by the department or centre as of March 31, PY, has been checked and is complete and correct.

3. Forecast

- a forecast of current year and new year EDP use, and an outline of longer range plans, including plans for the overall review of the provision of EDP services to the department;
- a justification of any new EDP services which the department proposes to provide in-house, and of any significant equipment or service acquisitions proposed for the CY or the NY.

Centre Report

1. Executive Summary

2. Past Year Report

- a review of centre service activities during the past year, in perspective of previous years and plans for the future, with comments on any important internal developments to support service activities and on operating results of the past year's business;
- a review of major users during the past year, the extent to which actual uses corresponded to plans, and whether the centre was able to meet user needs to their satisfaction.

3. Forecast

- an analysis of likely future business for the centre, and of the expected growth rates (or rates of decline) in particular centre activities;
- a discussion of the equipment and staff implications of likely future business, including a justification of any new services which the centre proposes to provide to its users in the CY or the NY, and of any significant equipment or service acquisitions in the same period, in relation to the target date for the overall review of equipment used and services provided by the centre;

Departmental Report**4. Appraisal**

- an appraisal of the EDP services used by the department and of the adequacy of available service sources to meet future needs;
- a brief review of EDP services (other than those organized in EDP centres or designated common-service EDP staffs) provided from in-house resources, and their cost and program effectiveness;
- suggestions for changes in EDP policy, directives, guidelines, the Master Plan or other aspects of the EDP environment.

The tables included in both sets of reports should illustrate the discussion and provide inputs for the aggregation and planning of the total government use and cost of EDP. The latter group of tables is specified in the following list. Where financial data relating to EDP is shown, it should be in terms of the concepts described in Chapter VII. Four basic tables are required to support departmental reports, with four others required where applicable (for departments supplying some EDP services from in-house resources). Those departments selling EDP services outside the public service will also have to present the price schedules applicable at the end of the Past Year, and proposed for the beginning of the New Year. EDP centres and designated common-service EDP staffs are required to include nine tables, plus copies of their price schedules applicable at the end of the Past Year and proposed for the beginning of the New Year.

Departmental Tables**A. From all Departments:**

1. Project Costs and EDP Costs (Model 1)
2. Summary of EDP Services Used, by Type (Model 3)

Centre Report

- a review of the expected financial results of future operations, and expected trends in operating results.

4. Appraisal

- an assessment of the adequacy of the centre's equipment and facilities to meet past and prospective demands;
- an appraisal of any major changes in the centre's equipment, organization, etc., necessary to permit the centre to fulfill its role optimally, including an appraisal of possible changes in its assigned role;

Centre Tables

All tables are required from all centres, if applicable.

1. Summary of EDP Full Costs and Revenues (Model 2)

APPENDIX III-1

Departmental Tables

3. EDP Services Used, by Project and Type (Model 4)
4. Use of EDP Services, by Supplier and Type (Model 5)
- B. Where Relevant:
 5. EDP Equipment Acquisitions During PY (Model 6)
 6. EDP Equipment and Services Acquisitions Forecast, CY and NY (Model 6)
 7. Full Costs and Revenues of In-House EDP Resources (Model 7)
 8. Operations Statistics for In-House EDP Resources (Model 9)

— Price schedules, PY and NY

Centre Tables

2. EDP Services Provided, by Customer and Type (Model 4)
3. Purchases of EDP Services, by Supplier and Type (Model 5)
4. EDP Equipment Acquisitions During PY (Model 6)
5. EDP Equipment and Services Acquisitions Forecast, CY and NY (Model 6)
6. Summary of Full Costs and Revenues of EDP Services (Model 7)
7. Computer Utilization Statistics (Models 8A, 8B, 8C as applicable)
8. Other Operations Statistics (Model 9)
9. Proportion of Revenues Earned at Schedule Prices (Model 10)
- Price schedules, PY and NY

Formats for these tables are provided in the following models. It is not expected that all details can be provided in reports to be submitted in September, 1974. Departments and centres should discuss their reporting problems with the TBS-ISD, and agree on the data to be reported in that year. In such discussions account should be taken of the principal expected use of each model as noted on the model.

It will be noted that certain conventional components of corporate annual reports, such as a balance sheet and a source and disposition of funds statement, are not included in the list. Departments and centres are of course free to include such additional statements in their reports, and are encouraged to do so when these will clarify the description of their operations or the nature of their plans.

Those preparing the report should be aiming at an informative document for their own senior management. For departments with little EDP involvement, the narrative portions of the report should usually be only a few pages in length. Departments with significant EDP involvement will usually require a somewhat longer commentary to cover even the bare essentials.

Model 1. Project Costs and EDP Costs

Project Name and Cost Type		PY-1	PY	CY	NY	NY+1
\$'000						
Project A	Total Cost EDP Cost					
Project B	Total Cost EDP Cost					
.....						
.....						
Project N	Total Cost EDP Cost					
All other EDP – using projects	Total Cost EDP Cost					
TOTALS	Total Cost EDP Cost					

DEPARTMENT
TABLE
1

Instructions:

1. List individually all projects with full EDP costs of \$100,000 or more in any year, and the next 10 largest projects with full EDP costs of \$25,000 or more for the new year.
2. Show as *Total Cost* for any project the sum of all EDP costs (whether provided without charge or charged), plus all other costs (excluding transfer payments) which will be paid from the departmental budget.
3. Show as *EDP Cost* for any project the cost or value of EDP services to be purchased from the private sector, or provided by EDP centres, designated common-service EDP staffs, or undesignated EDP units.

Use:

This form provides an overview of departmental EDP related activities in such a way that the EDP portion of the total cost can be viewed in relation to the total project cost.

APPENDIX III-1

Model 2. Summary of EDP Full Costs and Revenues

Service Type and Revenue/Cost		PY-1	PY	CY	NY	NY+1
		\$'000				
1.09 Computer Processing	Costs Revenues					
Revenue detail:						
a. Batch service, over-the-counter	Revenues					
b. Batch service, terminal	Revenues					
c. Text editing and processing	Revenues					
d. Interactive (time-sharing) service	Revenues					
e. Other	Revenues					
1.40 Document Reading	Costs Revenues					
1.43 COM Services	Costs Revenues					
1.46 Auxiliary and Unit Record Services	Costs Revenues					
1.50 Data Preparation Services	Costs Revenues					
1.59 Computer and Related Services n.e.s.	Costs Revenues					
5.60 Systems Services	Costs Revenues					
5.70 Programming Services	Costs Revenues					
9.91 Training Services	Costs Revenues					
9.95 Brokerage Services	Costs Revenues					
9.99 EDP Services n.e.s.	Costs Revenues					
TOTALS	Costs Revenues					

CENTRE
TABLE
1

Instructions:

All overheads to be allocated to a revenue-producing service. Any revenues and costs remaining for EDP Service 5.79 (Systems and Programming Services n.e.s.) should be included with 5.60. Show this full list of service types, even if the entries for some are nil.

Use:

This form will provide a basis for quick assessment of the extent of the government EDP market serviced by centres and designated common-service staffs, and of the operating results of these units.

APPENDIX III-1

Model 3. Summary of EDP Services Used, by Type

Service Type	PY-1	PY	CY	NY	NY+1
	\$'000				
1.09 Computer Processing					
a. Batch service, over-the-counter					
b. Batch service, terminal*					
c. Text editing and processing					
d. Interactive (time-sharing) service@					
e. Other					
1.40 Document Reading					
1.43 COM Services					
1.46 Auxiliary and Unit Record Services					
1.50 Data Preparation Services					
1.59 Computer and Related Services n.e.s.					
5.60 Systems Services					
5.70 Programming Services					
9.91 Training Services					
9.95 Brokerage Services					
9.99 EDP Services n.e.s.					
Total Services Used					

DEPARTMENT
TABLE
2

* Include over-the-counter service provided under a terminal contract.
@ Include batch service provided under an interactive (time-sharing) contract.

Instructions:

1. Show the full list of service types, even where the entries for some are nil.
2. Show amount paid for services (or value of services as calculated by a no-charge supplier).

Use:

This form will provide a basis for quick assessment of the total government demand for EDP services by service type.

APPENDIX III-1

Model 4. EDP Services Used, by Project and Type (Department) EDP Services Provided, by Customer and Type (Centre)

Project or Customer and Service Type	PY-1 actual	PY			CY planned		
		actual	planned*	variance			
\$'000							
Department A: Totals							
1.09a	Batch service, over-the-counter						
1.09b	Batch service, terminal						
1.46	Auxiliary service						
1.50	Data preparation services						
5.60	Systems services						
5.70	Programming services						
9.91	Training services						
Project X: Total							
1.09b							
1.50							
5.60							
5.70							
Project Y: Total							
1.09a							
1.46							
1.50							
5.70							
.....							
Department B: Totals							
.....							
Total Services Provided (Used)							

DEPARTMENT TABLE 3
AND
CENTRE TABLE 2

* As in previous Annual Report.

Instructions:

- Entries in this table will vary according to the department's projects or the centre's customers, and the services used or provided. Use the same service types specified in Models 2 and 3, but show only relevant headings.
- Departments should specify the same projects as were listed in Table 1 (Model 1), and a total for all other projects, and show the services utilized by each.
- Centres should provide a summary of the services used by each department or other customer. Where a customer has several projects, detail should also be shown for any project which accounts for 10% or more of total revenues for any service type in PY or CY.
- Variance should be calculated as actual-planned.

Use:

This form will help identify customers of critical importance to the continuance of particular centre services, and will help identify major projects with similar demand characteristics.

APPENDIX III-1

**Model 5. Use of EDP Services, by Supplier and Type (Department)
Purchases of EDP Services, by Supplier and Type (Centre)**

Supplier and Service Type	PY-1 actual	PY			CY planned		
		actual	planned*	variance			
\$'000							
Supplier A							
1.09b Batch service, terminal							
1.43 COM services							
1.46 Auxiliary services							
Total, Supplier A							
Supplier B							
1.09d Interactive service							
5.60 Systems services							
9.91 Training services							
Total, Supplier B							
.....							
.....							
In-House Resources							
1.40 Document reading							
1.50 Data preparation							
5.60 Systems services							
5.70 Programming services							
Total, In-House							
Total Services Used/Purchased							

**DEPARTMENT TABLE 4
AND
CENTRE TABLE 3**

* As in previous Annual Report.

Instructions:

- Entries will vary according to the suppliers and service types used by each department, agency and centre. Use the same list of service types as on Models 2 and 3.
- Centres and departments should both show the amount *paid for* services (or the value as calculated by a no-charge supplier).
- Only departments need show In-House Resources as a supplier (these are the EDP resources not organized in centres or designated common-service staffs, which will be listed as separate suppliers). In-House Resources should be the last supplier shown.

Use:

This form will provide a basis for the analysis of external services by supplier and type for input into the planning and reporting process.

APPENDIX III-1

**Model 6. EDP Equipment Acquisitions During PY
EDP Equipment and Services Acquisitions Forecast, CY and NY**

Note: Both tables apply to Departments and to Centres.

Acquisitions or Planned Acquisitions	PY or CY/NY (Annual) Cost	Acquisition Date	Contract Ends	Source	Reason for Acquisition
Item A	\$'000				
Item B					
Item C					
.....					
.....					
.....					
.....					
Item N					
All other equipment					
All other services					

Instructions (Model 6):

1. Service acquisitions are not required for PY, and need not be listed for CY unless TB approval in principle is required. These acquisitions are reported on Model 5.
2. List in *Acquisitions* or *Planned Acquisitions* column all acquisitions requiring TB approval in principle under Directive 4.1 or the General Procurement Guidelines, and any other acquisition whose annual cost, rental or imputed rental exceeds the larger of \$25,000 or 5% of the value of all EDP acquisitions. This list should group equipment units and service requirements having the same function, source and reason for acquisition, and acquired under the same conditions. Minor items should be grouped in two entries, one for "All other equipment", the other for "All other services".
3. Acquisitions include all renewals or continuances of existing rental or service contracts.
4. Show in *Cost* column the cost actually incurred in the PY, or expected to be incurred in the CY or NY. If cost in the subsequent fiscal year will differ from this figure, show the second fiscal year cost in brackets. If a capital acquisition is involved, show the purchase price in the Cost column, and the annual imputed rental in brackets.
5. Show as *Acquisition Date* the month and year in which a service will start (or started) or an equipment item will be (or was) delivered.
6. Show as *Contract Ends* the month and year in which a rental or service contract can be terminated without penalty, or to which new contracts will be negotiated. Leave blank for planned capital acquisitions or other outright purchases.
7. Show as *Source* the name of the supplier (if known) followed by "directed" or "renewal" if a directed contract or renewal of an existing contract is expected. Show "tender" where this is the expected acquisition method. If a probable supplier's name should not be divulged it may be represented by three asterisks (***)�.
8. The reason for acquisition should be briefly stated. Any required justification should appear in the text of the report. For contract renewals it will usually be sufficient to indicate "Service (equipment) required until --" (date of overall review of services, or any more relevant date).

Use:

These reports will provide a basis for approval in principle of most EDP acquisitions, and serve as evidence to the TB that required approvals have been obtained.

APPENDIX III-1

Model 7. Full Costs and Revenues of In-House EDP Resources (Department) Summary of Full Costs and Revenues of EDP Services (Centre)

Function of Personnel or EDP Expense/Revenue Class	PY-1	PY	CY	NY	NY+1
	man-years				
A. EDP Personnel					
Managerial					
Systems and programming					
Data conversion					
Data production					
Others					
Totals					
					\$'000
B. Full Costs					
02 Salaries					
05 Employee benefits					
08 Consultants and contract staff					
12 Production equipment rental — actual					
15 Production equipment rental — imputed					
18 Production equipment maintenance					
21 Data transmission costs					
24 External facilities					
27 Software acquisition					
39 Production supplies					
44 Accommodation					
48 Office furniture and equipment					
52 Travel					
55 Printing and stationery					
58 Telephone and telegraph					
61 Interest on working capital					
69 Other expenses					
72 Departmental costs					
75 Government costs					
78 Language training					
89 Internal charges					
Total Full Costs					\$'000
C. Revenues					
90 Revenue from users					
94 Appropriations and other revenues					
98 Credits and unbilled charges					
Total Revenues					

DEPARTMENT TABLE 7
AND
CENTRE TABLE 6

NOTE: Departments with no EDP resources other than those already reporting as part of an EDP centre or designated EDP staff can ignore this model.

Instructions (Model 7):

1. Department reports should not include data relating to EDP centres or designated common service staffs. EDP expense items 08 and 24 should show only costs incurred on behalf of their In-House Staffs, and not costs incurred for the direct support of departmental programs.
2. Include in *EDP Personnel* all man-years whose main duties are to provide data processing services. These include computer systems analysts, programmers, computer and unit record operators (including COM and OCR operators), EDP equipment maintenance staff, key punch and key-to-tape or key-disk operators, OCR typists, data control staffs, tape librarians, clerical and other EDP support staff, and the supervisors and managers responsible for these functions.

Do not include scientists, economists or other computer users who write their own computer programs in support of their primary functions, or clerical personnel whose main functions are the coding of input documents, transcribing of output data and similar non-EDP operations. Contract data processing employees should also be excluded (their cost should be shown against *Consultants and contract staff*).

The sub-categories of man-years should be reported on a functional basis, as follows (each total should include any appropriate service or civilian, regular, term or casual employees):

Managerial: Include middle and senior managers primarily concerned with supplying EDP services to other managers, and not primarily concerned with direct line supervision of staff.

Systems and Programming: Include all personnel assigned primarily for the purpose of systems analysis and programming, and their supervisors.

Data Conversion: Include key punch operators, key-to-tape or key-to-disk operators, OCR typists, and their supervisors.

Data Production: Include computer, unit record and data terminal operators, and their supervisors.

Others: Include EDP equipment maintenance staff, data control staff, tape librarians, text entry terminal operators, clerical, stenographic and other EDP support staff and their supervisors.

Uses:

These tables provide a functional staff summary and costs and revenues for aggregation into government totals.

APPENDIX III-1

Model 8A. Computer Utilization Statistics — Serial Processing Facility

	Units	PY-1 Total	PY				
			Total	Prime Shift	Sec. Shift	Third Shift	Hol. & Wkend.
I. Facility Use							
Scheduled hrs. of operation		Hrs.					
Power on and work in progress		Hrs.					
— On customer jobs		Hrs.					
Down time		Hrs.					
— Hardware malfunction		Hrs.					
— Software malfunction		Hrs.					
— Preventive maintenance		Hrs.					
Central processor use		CPU Hrs.					
Tape drive use		Av.Hrs./drive					
Lines printed		No.					
II. Workload Data							
Batch jobs completed		No.					
Abnormal terminations		No.					
Average elapsed time/job		Min.					
Average core requested/job		K. Bits					
Average lines printed/job		No.					
Average turnaround/job		Hrs.					
III. Special Equipment Use (if applicable)							
Documents/pages read		No.					
COM frames produced		No.					
Plotter time used		Hrs.					
IV. Explanatory Notes							

CENTRE
TABLE
7

Instruction:

The content of this report for any specific centre should be determined by discussion with ISD at the same time as this is done for quarterly reports (cf. Appendix VIII-3). Separate tables should be provided for all large and medium sized computers.

Use:

This table will identify overall equipment utilization for aggregation or summarization.

APPENDIX III-1

Model 8B. Computer Utilization Statistics — Multiprogramming Facility

Units	PY-1 Total	PY				
		Total	Prime Shift	Sec. Shift	Third Shift	Hol. & Wknd.
I. Facility Use						
Scheduled hrs. of operation	Hrs.					
Power on and work in progress	Hrs.					
Down time	Hrs.					
— Hardware malfunction	Hrs.					
— Software malfunction	Hrs.					
— Preventive maintenance	Hrs.					
Central processor use	CPU Hrs.					
— Problem programs	CPU Hrs.					
— Executive mode	CPU Hrs.					
Average I/O rate (or I/O request rate)	bits/sec.					
Main core use	K. bits x hrs.					
Tape drive use	Av.Hrs./drive					
DAS scratch space used	K. bits x hrs.					
— Problem programs	K. bits x hrs.					
Lines printed	No.					
DAS user space perm. mounted	K. bits					
II. Workload Data						
Batch jobs completed	No.					
Abnormal terminations	No.					
Average no. of concurrent jobs	No.					
Average core requested/job	K. bits					
Average data transferred (or I/O requests)/job	K. bits					
Average elapsed time/job	Min.					
Average CPU time/job	CPU Min.					
Average DAS used/job	K. bits					
Average lines printed/job	No.					
Av. tape drives requested/job	No.					
Av. turnaround/job/class	Min.					
III. Special Equipment Use (if applicable)						
Documents/pages read	No.					
COM frames produced	No.					
Plotter time used	Hrs.					
IV. Explanatory Notes						
ALTERNATIVE CENTRE TABLE						
7						

APPENDIX III-1

Model 8C. Computer Utilization Statistics – Time-Sharing Facility

Units	PY-1	PY				
		Total	Total	Prime Shift	Sec. Shift	Third Shift
I. Facility Use						
Scheduled hrs. of operation	Hrs.					
Power on and work in progress	Hrs.					
Down time	Hrs.					
– Hardware malfunction	Hrs.					
– Software malfunction	Hrs.					
– Preventive maintenance	Hrs.					
Central processor use	CPU Hrs.					
– Problem programs	CPU Hrs.					
– Executive mode	CPU Hrs.					
Average I/O rate (or I/O request rate)	bits/sec.					
Tape drive use	Av.Hrs./drive					
Lines printed	No.					
DAS user space perm. mounted	K. bits					
Av. % DAS in use	%					
II. Workload Data						
(a) Batch Jobs:						
Number completed	No.					
Abnormal terminations	No.					
Average elapsed time	Min.					
Average CPU time	CPU Min.					
Av. data transferred (or I/O requests)	K. bits					
Average DAS used/job	K. bits					
Av. tape drives used	No.					
Average lines printed	No.					
Av. turnaround/job/class	Min.					
(b) Conversational sessions:						
Number completed	No.					
Av. line connect time	Min.					
Average CPU time	CPU Min.					
Average response time	Min.					
III. Special Equipment Use (if applicable)						
Documents/pages read	No.					
COM frames produced	No.					
Plotter time used	Hrs.					
IV. Explanatory Notes						
ALTERNATIVE CENTRE TABLE 7						

APPENDIX III-1

**Model 9. Operations Statistics for In-House EDP Resources (Department)
Other Operations Statistics (Centre)**

	PY-1 actual	PY			CY planned
		actual	planned*	variance	
Computer A (Model)**					
Mode of operation					
Power on and work in progress					
Down time					
Idle time					
Document Reader A (Model)					
Power on and work in progress					
Down time					
Idle time					
Forms read					
Data Preparation Services					
Cards punched					
Errors/K cards					
Records keyed to tape					
Errors/K records					
Systems services					
Projects started					
Projects completed					
Hours of service sold					
Hours unsold (training, leave, etc.)					
Training Services					
No. of courses given					
No. of trainees					
No. of trainee man-days					
No. of instructor class-days					
Etc.					

**DEPARTMENT TABLE 8
AND
CENTRE TABLE 8**

* As in previous Annual Report.

**This item would not appear on this table in Centre reports (see Model 8).

Instructions:

This table should present quantitative data considered to be suitable performance indicators by the reporting department or centre. Entries will vary according to EDP services and equipment units. An effort should be made to provide some performance data for any major equipment unit and service. The items shown are illustrations only.

Use:

To provide physical standards which will help assess performance and provide inputs for the development of performance measures.

APPENDIX III-1

Model 10. Proportion of Revenues Earned at Schedule Prices

Service Type	PY		% at Schedule Prices		
	Total Revenues	Schedule Revenues	PY-1	PY	CY
	\$'000		%	%	%
1.09 Computer Processing					
a. Batch service, over-the-counter					
b. Batch service, terminal					
c. Text editing and processing					
d. Interactive (time-sharing) service					
e. Other					
1.40 Document Reading					
1.43 COM Services					
1.46 Auxiliary and Unit Record Services					
1.50 Data Preparation Services					
1.59 Computer and Related Services n.e.s.					
5.60 Systems Services					
5.70 Programming Services					
9.91 Training Services					
9.95 Brokerage Services					
9.99 EDP Services n.e.s.					
Total Revenues					

CENTRE
TABLE
9

Use:

This table will indicate the extent to which schedule prices are the effective prices at which centres operate, and provide a guide to the type of competition practiced.

LIST OF EDP CENTRES AND DESIGNATED COMMON-SERVICE EDP STAFFS

The EDP centres and designated common-service EDP staffs listed in this Appendix are to provide the TBS with quarterly reports on financial performance and computer performance as specified in Chapter VII, Appendix VII-4, and Chapter VIII, Appendix VIII-3. They are also to provide Annual EDP Reports and Plans as prescribed for EDP centres in Appendix III-1.

Other EDP centres will be added to this list as they become operational or are specified in future editions of the EDP Master Plan. The designation or delisting of other common-service EDP staffs will be determined when annual EDP reports and plans are reviewed. Designations in this list are for reporting purposes only.

Custodian and Centre/Designated Staff	Present Status
Department of Agriculture	
1. Data Processing Division*	Designated
2. CANFARM	Designated
Department of Communications	
3. Communications Research Centre	Designated
Department of Energy, Mines and Resources	
4. Computer Science Centre	Designated
Department of the Environment	
5. Atmospheric Environment Service, Dorval	Departmental Centre
6. Atmospheric Environment Service, Downsview	Designated
7. Canada Centre for Inland Waters, Burlington	Designated
Department of Manpower and Immigration	
8. Computer Services Branch*	Designated
Department of National Defence	
9. Computer Services Branch as constituted on Jan. 1/73	Departmental Centre
National Research Council	
10. Computation Centre	Designated
11. Communications Branch Computing Operations	Departmental Centre
Department of National Revenue – Customs and Excise	
12. Computer Services Branch*	Designated

APPENDIX III-2

Custodian and Centre/Designated Staff	Present Status
Department of National Revenue — Taxation	
13. Computer Services Division	Departmental and Functional Centre
Post Office Department	
14. Management Information Systems Branch	Designated
Public Service Commission	
15. Information Management Centre	Designated
R.C.M.P.	
16. Canadian Police Information Centre	Departmental Centre
Statistics Canada	
17. Systems and Data Processing Branch	Departmental Centre
DSS — Supply	
18. Systems and Data Processing Branch	Designated
19. Text Editing and Photocomposition Branch (Printing Operations)	Departmental Centre
20. Text Processing Applications Centre*	SWAC
DSS — Services	
21. Data Processing Branch (except CPP Division)	Departmental Centre
22. Canada Pension Plan Division	Designated
23. Advisory Bureau for Computing*	Designated
Ministry of Transport	
24. Trade and Transportation Centre	Functional Centre
Unemployment Insurance Commission	
25. Systems Development Branch	Designated

* No computer performance report required.

NOTE: The list in this Appendix is preliminary and subject to discussion with the departments concerned.

GUIDE ON EDP ADMINISTRATION

Chapter	IV
Date	
	August, 1974

DEVELOPMENT AND CONTROL OF EDP PROJECTS

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APPENDIX

- IV-1. DETAILED LISTING OF PROJECT DEVELOPMENT AND CONTROL ELEMENTS

GUIDELINES

2.1 Plans for EDP projects should recognize that such projects must pass through five distinct stages, at each of which it should be possible to terminate the project:

- Initiation, Preliminary Analysis and Planning,
- Analysis,
- Design,
- Development,
- Implementation.

All participants in an EDP project, including the responsible representatives of the eventual users as well as of the implementors, should "sign off" at the close of each stage before the next stage is commenced.

Some of these stages will often be combined, especially for smaller projects. When necessary, this should be a deliberate decision taken after consideration of any risks involved, not merely the result of ad hoc blurring and overlapping.

2.2 Senior departmental management, or their representatives, should be especially concerned with the Initiation and Planning stage of EDP projects when commitment, in principle, of substantial departmental resources is at issue. They should also review these projects at the close of the Analysis and Development stages, and after Implementation, to determine whether departmental objectives have been achieved.

2.3 The plans for EDP components of departmental projects prepared during the Initiation, Preliminary Analysis and Planning stage should indicate the amount and timing of resource requirements expected for all stages of the development process, and should also provide for any required approvals, reviews and legal procedures. To ensure against delays it is advisable to consult at this stage any departments and agencies whose involvement may later become necessary. Each succeeding stage should provide a detailed resource requirement for the following stage and an adjustment of the general plan provided in the Initiation and Planning stage.

A. INTRODUCTION

The guidelines on EDP planning concentrate on overall EDP planning from a governmental, departmental or EDP centre point of view, but do not deal with the planning, implementation and control of specific projects in any degree of detail.

It is the purpose of this chapter to assist those involved in projects with a significant EDP content to ensure that the project is accomplished on time, at the predicted cost and, most important, that it does the job it was intended to do.

Projects come in all shapes and sizes, and all have their particular difficulties. There are, however, many aspects which are common to most projects. This is particularly true of projects involving the use of EDP, where time and again, projects meet either with total failure or only partial success for one or more of the following elementary reasons:

- the user was not sufficiently involved at the planning stages,
- the complexity of the system problem was grossly underestimated,
- the user demanded fundamental system changes during the development phase,
- the system was too complex for the non-technical user,
- manufacturers' hardware or software did not perform as promised,
- senior management became involved only when there were signs of problems.

A factor crucial to the success of EDP projects is the identification of review points for project management, functional (or user) management, and policy management. This chapter both identifies appropriate review points and indicates the type of information which should (and by implication should not) be available at each review point. It is a common failing to slip too quickly into detailed aspects of project development before the larger scale problems have received adequate attention.

In most situations, the review by policy management will be undertaken by senior departmental personnel only. However, the Information Systems Division and/or the Program Branch of the Treasury Board will, from time to time, participate with departmental management in the review of EDP projects of particular interest.

One of the most difficult parts of any project is the estimation of its cost and duration. There can be no hard rules to guide project estimators; experience is still the best teacher. In Part F on Estimation and Project Control an attempt has been made to provide some useful "rules of thumb". The importance of treating the estimation process as part of the project control process, and not as an isolated event used to obtain management assent to the project, is emphasized throughout.

The general objectives of this chapter are:

- to provide an overall approach, drawn from the experience of many users, enabling new EDP applications to take advantage of that experience while providing the flexibility to allow for innovation and creative thought;

- to encourage uniformity of approach to EDP applications and provide for easier evaluation of those applications before, during and after implementation;
- to provide the necessary controls during analysis, design and development of EDP applications to ensure that projects progress within pre-determined time frames, are implemented and operating on schedule and within budget, and continue to meet their objectives;
- to encourage new EDP applications to take advantage of specialty expertise that already exists in various government agencies;
- to provide for early management involvement in EDP development and ensure that there is both controlled progressive commitment of resources and adequate opportunity to terminate projects at any stage.

B. PROJECT REVIEW COMMITTEE

Experience has shown that a vital element in the selection and implementation of projects with a sizeable EDP content is their careful review and consideration by a group of senior managers who, among them represent potential system users, departmental policy formulators and EDP management. The seniority of the committee members will of course be dependent on the size and nature of the project, but many organizations insist that all medium and large scale projects as well as new small projects receive the approval of the senior executive committee of the organization at the end of the preliminary analysis, planning, analysis, development and implementation phases of the project (see Figure 1). The words "Project Review Committee" as used in this chapter can be taken to refer to the departmental senior executive committee for most medium and large projects, and to a committee of similar representation but at a more junior level for smaller or less important projects.

C. PROJECT SELECTION

Project selection is a problem common to practically all management. The only complicating factor introduced by EDP is the technology itself, which has an unfortunate history of distracting attention from more fundamental considerations. This tendency is being corrected quickly, and those proposing projects with a sizeable EDP content can expect senior management to look for answers to such questions as:

- How does the project tie in with the enunciated goals of the department?
- Is it economically feasible even under worst case estimates?
- Is it technically feasible? How much risk and experimentation is involved?
- Is it operationally feasible? Will people really use it?

- What are the potential adverse consequences of introducing the system?
- How much rapid change is implied in the implementation? "The great leap forward is best accomplished in short, comfortable hops."¹
- Will the success or failure of the proposed system be measurable?

Basic management commitment will normally take place at the close of the planning phase (as described in Part E), at which time answers to the above questions should be available in general terms, but management will expect to be making a progressive commitment to the project, and will want to see several milestones where projects which fail to meet expectations can be cancelled. For many projects, feasibility cannot be fully determined until system analysis (or in some cases, design and development) has taken place. Nonetheless, project proposers should strongly resist the temptation to demonstrate feasibility by going into details of implementation at the planning stage. Senior management will want areas of high risk identified, but will not want to see valuable resources expended on the details of how a project should be implemented, before its potential benefits have been assessed. All large projects are likely to be reviewed by the departmental management committee, many (and possibly all) of whom will not be EDP experts. The wisdom of providing answers to questions which are at their (largely non-technical) level of concern should be apparent.

D. MAKE OR BUY

Experts from the private sector can be retained to meet almost any demand with which the government is faced. This is particularly true in areas where EDP expertise is required. Outside expertise can be called in at almost any phase of a project, though participation in the Analysis, Design and Development phases is most common. Canadian experience with the contracting out of complete projects has been primarily in areas such as scientific and defence systems. Administrative systems have, for the most part, been undertaken using in-house staff, sometimes supplemented by consultants hired to work on particular sub-projects. Other governments have experienced some success in contracting out the development of some of their administrative systems.

Some of the *advantages* of contracting out major phases of a project are:

- *Costs more predictable:* It is usually possible to contract a well defined task at a fixed cost. Moreover the competition inherent in the tender process often results in lower costs when these are calculated on a full cost basis as described in Chapter VII.

1. Quoted in *EDP Analyzer*, May 1973 from R.I. Benjamin,
"Control of the Information System Development Cycle".

- ***Time of completion more predictable:*** Because of the usual severe economic consequences in the private sector of taking longer than estimated to complete a project, it will usually be possible to obtain a more accurate project completion date.
- ***Forces clear project definition:*** The nature of the contracting process requires a clear definition of objectives and of the finished project. Clear definitions are more easily fudged when projects are undertaken internally.
- ***Easier to discontinue a project:*** If a project is not turning out as planned, it is easier to cancel it if departmental managers do not have heavy personnel resources committed. Cancellation requires that the contractor be given clearly defined milestones and an unequivocal understanding that cancellation will be seriously entertained if these milestones are not reached on schedule.
- ***Encourages the growth of a potentially useful industry:*** By placing work outside the department it is more likely that the expertise gained in undertaking the project in question can be usefully employed elsewhere.
- ***Allows management to concentrate on prime responsibilities:*** For many departments, an important advantage of acquiring services from the private sector is that it relieves departmental management of a supervisory burden, thus freeing up their time to work on matters of more particular concern to the department.

Some of the *disadvantages* of contracting out major phases of a project are:

- ***Project modification may be more difficult:*** Because a contractor is normally working under tight budgetary and time deadlines, it is usually more difficult and sometimes more costly to introduce system changes once the contract has been let. In some circles this may be thought of as an advantage since it forces a hard appraisal of all proposed system changes. Sometimes it is almost impossible to define a project clearly in the initial stages, however, and it is possible for the contractor, by narrow interpretation of a contract, to deliver an unusable or inappropriate system. The best protection for the department is the normal desire of a business enterprise to continue to do business with the government — a situation which is made more difficult with each dissatisfied customer. By requiring the contractor to produce the documentation recommended at the end of each project phase, the user department can obtain advance warning of problems, and take appropriate action.
- ***Fixed cost contracts may not be possible:*** The risks associated with project development may be too great to make fixed price contracts sensible in some cases. Other types of contractual arrangements are

possible, and will be suitable in some circumstances. It should be noted, however, that some of the advantages of contracting out are considerably attenuated in such circumstances.

- *Benefits of learning lost to the department:* Almost any project results in substantial education of the participants in the problems and solutions associated with the project. The department often has a need to retain, on an on-going basis, people who have received the education afforded by the project development process. In many cases, it will be possible to circumvent this problem by some combination of:
 - seconding departmental personnel to the project,
 - hiring contractor personnel at project completion,
 - contracting out the on-going maintenance of the system produced.

Security is *not*, except in exceptional circumstances, a reason for deciding against contracting out project work. It is possible for contractor personnel to be subjected to the same security clearance processes as government personnel, and there is no evidence to indicate that information is any more or less secure when it is in the hands of appropriately cleared private sector organizations.

For large projects where several sub-contracts may be involved, some thought will need to be given to whether system integration can best be handled by a contractor or by the department. Once again there are arguments for both approaches, the weight of which will be highly project dependent. A major advantage of contracting out the system implementation is that it reduces somewhat the potential complexity of disagreements by restricting them (to the greatest extent possible) to disagreements between two parties in the private sector.

In considering whether to make or buy EDP services, departments should not assume that either alternative will always be the best. Departments which make more than incidental use of EDP services should not assume that contracting out will eliminate their need for in-house EDP specialists. The preparation of projects for tendering, the assessment of tenders received and the monitoring of contractor performance all require EDP technical and managerial skills. In fact, the level of senior skills required to manage an EDP budget of a given size is probably about the same regardless of whether "make" or "buy" accounts for the bulk of full EDP costs.

E. PROJECT PHASES

All projects can be broken up into stages, which in this Guide are called initiation, preliminary analysis and planning; analysis; design; development; and implementation.

Project development through these stages provides for logical review milestones and progressive, controlled, commitment of resources.

The depth of project involvement with some activities, and the level of management to which the project reports, will generally be dictated by the size and nature of the project. However, the need for the various activities described will be more appropriately determined by the application itself, and its impact on the organization, rather than by the project's size alone.

The table below summarizes the major project phases and approval authorities, while the Summary Chart which appears as Figure 1 provides a listing of the activities relevant to each phase. A brief description of each project stage is provided in this Part. A much more detailed description is provided in Appendix IV-1.

Project Stage	Approval for Advance to Next Stage
1. a. Project Initiation b. Preliminary Analysis c. Planning	User Management Project Review Committee Project Review Committee
2. Analysis	Project Review Committee
3. Design	User Management
4. Development	Project Review Committee
5. Implementation	Project Review Committee

1. Initiation, Preliminary Analysis and Planning

a. Initiation

Large projects will often be conceived by top management, in which case extreme care should be exercised to ensure that the working level do not get involved in excessive detail during preliminary analysis.

Small or medium size projects are more likely to originate with the user, or to be identified by existing project teams, as opposed to emanating from long-range departmental EDP plans and, for this reason, project concepts, their impact on the organization and system objectives can often be more readily identified without exhaustive investigation. This does not mean, however, that considerations of need, costs and benefits should not be taken into account when judging the feasibility or desirability of undertaking the project.

b. Preliminary analysis

The preliminary analysis should include an examination of the current system (where applicable), and a determination of the proposed system. A preliminary report will be required for consideration and approval by the Project Review Committee. Such a report should provide a professional judgement on whether the current system is already meeting most of the objectives or requires only minor modifications to meet those objectives, or whether a new system should be designed.

c. Planning

Providing the preliminary analysis indicates continuation of the project, the planning stage will produce a problem definition, a statement of system objectives as approved by functional management and a project plan, supplemented by an analysis team proposal. Any security considerations should also be identified. This documentation will provide the basis for a presentation seeking Project Review Committee authority to discontinue, to defer or to proceed. The Project Review Committee can be expected to want at least preliminary answers to the questions listed in Part C.

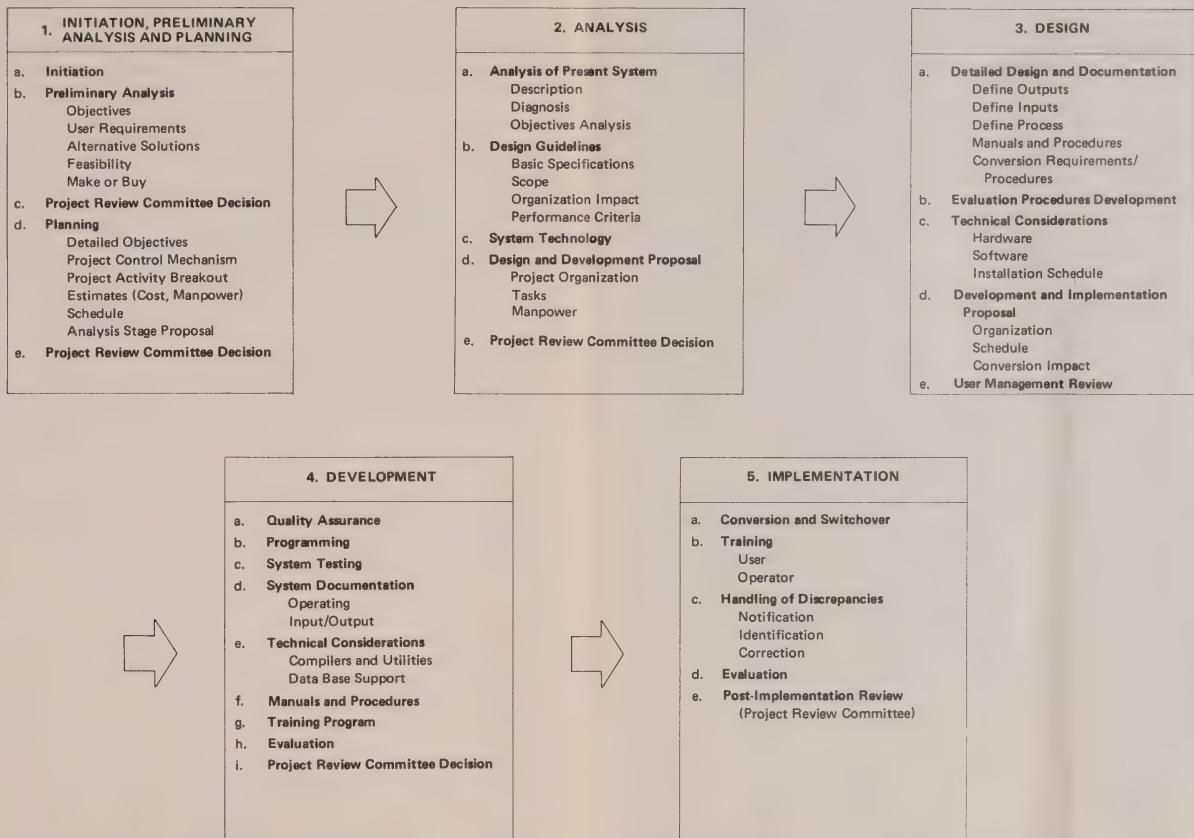
2. Analysis

The analysis phase requires a re-examination of the principles, concepts and overviews established in the planning stage. However, the level of detail required is substantially greater.

If there is an old system currently operating, its strong points as well as its shortcomings should be documented and understood. Some system components may be reusable, or temporarily useable during a gradual phase-over to a new system.

Design guidelines should be developed in sufficient detail to provide terms of reference for the design team and a deeper analysis of the project's scope and its impact upon the department. Likely additional hardware and communications requirements (if any) should be identified. For some projects it may be necessary to develop the design guidelines in sufficient detail to permit hardware acquisition planning to begin.

FIGURE 1. SUMMARY CHART – EDP PROJECT ACTIVITIES



The type of project organization to be adopted should be determined and a proposal prepared detailing representation, tasks, manpower and a project schedule. It is usually advisable to involve those likely to be responsible for programming, both in the development of this proposal, and in the design stage.

The information assembled by the analysis team should now be formally presented to the Project Review Committee and all options thoroughly explored. Again, management's alternatives are to abandon the project, defer it, refer it back for more analysis or proceed to the next stage.

3. Design

Project evolution to this point has been within a relatively small, easily-managed group. The proliferation of activities attendant upon the design stage dictates a greater degree of project direction and control. If a project leader has not already been appointed, he should be appointed at the start of this phase. He will need to spend a significant portion of his time in staffing and team organization activities.

Adoption of the principle of a system freeze after the design stage will help to concentrate the attention of both potential users and systems analysts on the problem of developing complete system specifications. During this stage, the system should be defined in terms of outputs, inputs and processes. Conversion requirements and initial operating considerations, such as parallel or pilot operations, should also be identified.

For larger projects an evaluation plan is essential, and should be agreed to and signed off by the appropriate user and project managers. Detailed evaluation procedures should be developed during the next (development) phase. While a formal evaluation committee approach may not be required for small or medium projects, the principle of formulating evaluation criteria during system design still applies.

Where new or additional equipment is required to support the project, the department should now be in the final stages of the selection process. While actual installation at this point is not mandatory, acquisition should at least reach the point of identifying the supplier and the exact hardware and software to be used. Without this information, the development stage of the project cannot proceed.

A development and implementation proposal should be prepared which takes account of the department's activity cycle. Hardware installation (if applicable) and conversion requirements should be prepared.

Any project impact on non-EDP areas of the department should now be becoming apparent, and plans should be laid for effective departmental action in these areas.

The design team will be required to make a formal, detailed presentation to functional management to demonstrate that the proposed design will meet the original objectives approved by them in the planning stage, and secure their support of a system freeze (or rigorous change procedures) throughout succeeding stages. Functional management's options are to approve, to request rework of the design or to request a partial resubmission to the Project Review Committee should they feel that the original objectives have been significantly compromised.

4. Development

Ineffective development activity can cripple the best-designed project. Project controls take on ever-increasing importance during this stage, particularly since project manpower will reach its maximum, and hence effective communications will be most difficult. Sound program design, exhaustive testing and complete documentation cannot be overemphasized. The use of chief programmer teams and structured programming are currently receiving much attention as suitable development techniques for large projects (see Reference 6). Although the design of the system should now be frozen, the development phase will usually uncover, and compensate for, some minor design flaws.

Evaluation criteria and procedures, in addition to their vital role in measuring the final performance of the system, can also be of enormous assistance during the development stage (particularly during system tests) in estimating final performance.

At the end of this phase, a complete presentation should be made to the Project Review Committee for a decision as to whether the project should be deferred, returned to the design or development stage or approved for conversion and implementation. The cancellation of the project at this point is not inconceivable; the future costs of operating and maintaining an inadequate system could exceed the investment to date.

5. Implementation

The conversion process should be planned and developed with care equal to, or exceeding, the development of the new system. Stringent validity checking should be enforced, especially when creating new files from old. This is particularly important if the old file has not had the benefit of constant monitoring. Wherever possible, a pilot or parallel operation should be undertaken for an initial period.

Training should precede and overlap conversion and initial operation periods. Close supervision and review of both manual and computer areas during these periods will bring out errors and inconsistencies which, in addition to identifying training or retraining needs, will also reveal discrepancies in the system.

A notification network that will encourage discrepancy feedback from users, functional personnel, machine operators, the public, etc., should be established. All discrepancies should be analysed and documented, and appropriate corrective action taken until the system can be finally evaluated.

The final evaluation criteria should be applied to the new system and, where warranted, the system should be referred back to the development team for further corrective action, until the objectives and performance requirements have been met or are within accepted tolerance levels.

The information gathered during evaluation and implementation should be assembled into a post-implementation audit report for the Project Review Committee.

6. Project Cancellation

Project cancellation is a difficult task, primarily because it is difficult to cancel a project without at least inferentially affixing blame and making visible an apparent wasteage of public funds. It must be clear to everyone that if any progress is to be made, some unsuccessful projects will be attempted, and that in some circumstances the lack of success may not become generally apparent until fairly late in the project cycle.

The importance of early detection of unsuccessful or marginal projects is obvious. A key factor in the detection process is the establishment of visible, measurable system milestones at which progress may be realistically assessed and reviewed. The following quote from Reference 1 may be of interest:

"The delay in killing a project introduces an interesting phenomenon that Charman calls the Law of Remaining Project Value: 'Marginal projects become viable by stays of execution.' The reasoning behind this principle is that the further along in development a project is, the closer it is to delivering benefits. It will be quite difficult to kill a project in [the development phase], for instance, because not much work may yet be needed before benefits will start to occur. Management's decision, however, should just look at the present value of the (discounted) future benefits and the present value of the (discounted) future costs. These figures should then be compared with the figures of other projects in which management can invest the resources."

F. ESTIMATION AND PROJECT CONTROL

Management decisions concerning the continuation of a project or a change in its scope or direction will be based to some degree on estimates. Thus estimates must play an integral part in project control. The process for estimate revision must not in any way be an automatic process. Each change must be carefully investigated and documented. When substantial changes to estimates evolve during project development, management decision points can be created over and above those outlined in Part E. Formalized aids to project control (such as PERT, or other critical path or progress charting methods) and project progress monitoring do not in themselves provide project control systems. A definite effort to produce realistic estimates, continuous time and progress reporting and a commitment by management to be involved in the project control system are essential.

Estimating depends largely on the knowledge, experience and judgement of the estimator. This is true even when using analytical or simulation techniques either structured or unstructured. The danger of using a formalized technique is that the results appear more accurate than they often are. However a systematic approach to estimating and incorporation of estimates and estimate revision into a project control system will develop experience in estimating and increase the ability to carry this experience forward to future projects.

The most significant step towards effective estimation and indeed to the effectiveness of any project control system is the breaking down of each phase of a project into well defined tasks and sub-tasks. There is a tendency with EDP projects to claim that each one is unique and bears little resemblance to previous projects. This may well be true viewing each project as a total package, but is rarely true once a project has been broken into standard parts. The breaking down into standard parts allows experience from previous projects to be more easily projected into current estimates. The ability to use past experience and make projections from analogous situations is the most valuable tool available in estimating.

For most aspects of project control time estimates will be used to create a schedule of events and later used in the project control process, but for creating a project budget, for making an economic analysis of a project's viability and for budget control during project development, time estimates will have to be converted to cost figures. This applies to both machine and people time estimates, and suitable unit cost figures will be required to do this. Such unit costs will not only depend on factors peculiar to the individual task at hand but also on the particular environment within the organization. Unit cost figures should therefore be developed within each organization based on the full cost financial concepts discussed in Chapter VII.

Of equal importance to the estimates themselves is the development of a cost and time control system for the project. In most cases a formalized reporting system for the time and budgetary control will exist within each EDP organization. Such systems tend to be purely reporting systems and not in themselves project control systems. Procedures must be developed for each project which allow early detection of discrepancies between progress and estimates, enabling the reasons for the discrepancies to be identified and corrective action taken or estimates to be revised. As project schedules are based on estimates, early detection of discrepancies is essential if an orderly progression through the project phases is to be maintained. The key to such detection is the establishment, when schedules are prepared, of clearly defined milestones or achievement points within each phase of the project, and then designing the progress reporting part of the control system to show progress towards and achievement of these milestones. A description of an adequate control system is not included in this chapter. Guidelines for creation of such systems can be found in several publications including References 2 and 3.

The effort expended on estimating and the scope and complexity of the project control system will generally be dictated by the size and nature of the project together with considerations of functional aspects of the project and their impact on the organization.

Projects are often delayed by factors which are only partially foreseeable. In scheduling and estimating the cost of projects, appropriate allowances should be made for such factors as:

- approvals (by the Project Review Committee, Treasury Board, etc.),
- equipment deliveries,
- responses to tenders and subsequent evaluations,
- potential legal problems,
- strikes.

1. Preliminary Analysis

During the preliminary analysis phase, the first gross estimate of total project time and cost must be made in order that sufficient information is available for a meaningful decision on the movement of the project to the next phase.

At this point in project development there is little formalized aid available to the estimator to supplement his knowledge and experience. Time estimates should be detailed concerning the planning phase in order that a schedule for this phase can be prepared and cost estimates made. Estimates for subsequent phases will necessarily be approximate and should not in fact be too detailed at this stage. Estimators will likely go through a "what if ...?" process when making estimates for these latter phases. This process will result in a range of values dependent on the assumed design and implementation circumstances. At this stage making estimates in the form of ranges (perhaps varying more than 100%) is more realistic than suggesting single figures, and can sometimes be of assistance when making the decision to move to the next phase.

From the estimation point of view, the creation of or adaptation of a project control system is also important as it is a specific task in the planning phase of a project and must be included in the estimates for this phase.

The schedule for the planning phase will be influenced by the variety of sources of information to be contacted and the availability of these sources. The cost of the planning phase could be influenced by the location of these information sources. Overall the estimate will be made by an experienced analyst (probably the one who will carry out the planning phase) and his estimate will be based on previous experience in planning and knowledge of the organization's environment.

In addition gross estimates for the later phases are also required at this time. These phases are not as yet broken into sub-projects and estimates will be based on direct comparison with previous projects. Both gross time and cost estimates should be made for all phases.

All projects have their own peculiarities and constraints. Experience should be the basis for first estimates. It can sometimes be helpful to crosscheck estimates derived in this fashion with the generally experienced ratios of elapsed time and expenditure in each project phase, and then to determine the reasons for apparent project variance from the norm. Various figures of accepted norms appear in articles and books on the subject. All exhibit the same general pattern, with slight differences in project phase categorization and percentages. A useful approximate guide is as follows:

Project Phase	Elapsed Time (%)	Cost (%)
Initiation and preliminary analysis	5	2
Planning	10	5
Analysis and design	25	18
Development	40	45
Implementation	20	30

2. Planning

During the Planning phase detailed estimates should be prepared for the Analysis and Design phases of the project and estimates for later phases revised.

There is at present no generally accepted method available to the analyst to assist in making estimates of the analysis and design phases of an EDP project. Revised estimates for the development phase will still be gross estimates. There will not be sufficient information available to make detailed estimates until after the analysis phase is completed. The revised estimates for the development and implementation phases should reflect all additional information obtained during the planning phase. Where changes are made to estimates, the changes should be related either to clarifications of the environment or of the requirements. Such clarifications should also enable the variation in estimates given as ranges to be reduced.

Activities in the Planning phase of prime importance in making estimates and in the preparation for making use of estimates are the identification of the separate activities in the Analysis and Design phases and the establishment of the project progress reporting and monitoring system. Once the sub-activities in the analysis and design phases have been identified, individual estimates for each activity, both time and cost, should be made. Schedules for the Analysis and Design phases can be prepared from the time estimates. Schedules and estimates are essential inputs to the project control system. Estimates for individual activities will be made by experienced analysts, basing estimates on their experience and knowledge of the environment. For large projects reliance on single source estimates should be avoided and in all cases estimates should receive some review from other experienced personnel. Comparison between estimates made internally for analysis and design work and estimates made outside the organization should be made when feasible to do so. Such comparisons provide a basis for evaluating the efficiency of the organization and also improve the basis for future estimates.

Although there is no established method for estimating the analysis and design phases, a number of factors relating to the environment and the project should be taken into account when estimates for the various sub-activities are made. These include:

- the type and complexity of the project,
- analyst experience,
- likely personnel continuity over the project period,
- management procedures,
- source of user requirements,
- number of potential users,
- similarity to present systems,
- research requirements,
- special skill requirements,
- project control system,
- recruitment requirements,
- definitiveness of user requirements.

During the planning phase estimates will be used to carry out an economic cost-benefit analysis of the project. Although estimates for the Development and Implementation phases will not have been made in detail, a breakout of estimated costs into general categories is advisable both as an aid to improving the estimates themselves and as an aid to interpreting the results of the analysis.

All anticipated one time or non-recurring costs should be estimated including:

- project management (including control overheads),
- planning,
- recruitment,
- training,
- analysis,
- design,
- development,
- accommodation,
- hardware,
- software,
- pilot project,
- parallel tests,
- conversion,
- travel.

If project implementation will lead to an operational system then recurring project expenses should be estimated separately. Such costs could include:

- hardware costs,
- accommodation,
- salaries,
- supplies,

- management,
- hiring,
- training,
- maintenance,
- monitoring.

3. Analysis and Design

During the analysis and design phases, progress through sub-activities should be reported regularly through the project control system. Progress may be expressed in percentages of each sub-activity completed; effort expended on each sub-activity can then be directly compared with the estimated cost and schedule. The "milestones" established for this phase will likely include most sub-activity completions. Percentage completion estimates for both milestones and sub-activities will themselves be estimates made by individual analysts and should be reviewed by the project supervisor who should be aware of, and guard against, the tendency of many activities to progress rapidly to a 90% complete status, and then require a disproportionate amount of time to complete. For this reason, many project managers insist that sub-activities be broken up finely enough that progress is measured only in terms of 100% completion of project elements, and no fractional completions are considered.

The importance of engaging in the estimation process those who will actually be doing the work cannot be overemphasized. Supervisors will need to ensure that the estimates of those who will do the work are neither over optimistic nor over pessimistic. The schedule should be agreed to by both parties before the work commences if the all-important commitment to live by it is to be maintained.

The design phase will identify in detail all sub-activities in the development phase and establish milestones for progress monitoring. Estimates for these sub-activities can then be made. A variety of aids to estimating program development time and costs have been developed, ranging from general rules of thumb to detailed methods incorporating many variables describing the nature of the program and expertise of the programmer. The main danger from the use of rules of thumb arises from applying them indiscriminately in different environments and thus establishing misleading estimates or making unjustified comparisons. Rules of thumb are best used as a check on estimates already made and in making comparisons with standard environments. The main danger in using detailed methods is that they are often far more complicated than the accuracy of the input data would seem to justify. This tends to make the results obtained seem more accurate than they really are. Such methods, even though they have proved useful and accurate in many environments, are best used to supplement the estimates of an experienced analyst. Several aids to estimating are given below.

a. **Rules of thumb**

- (i) Programming activities tend to break down by time as follows:

Logic development	35%
Coding	25%
Debugging and testing	35%
Documentation	5%

- (ii) Cost per instruction of debugged and tested software varies between \$2 – 15 depending on type of program, language and computer used. Small high level language programs should fall in the low end of this range and modules of large systems in assembly-type languages at the high end.
- (iii) Programming (including logic development through to final documentation) output varies from one to three instructions per program hour for assembly type languages and three to six times greater for higher level languages such as COBOL and FORTRAN when the output is measured after compilation in machine language instructions.
- (iv) The following table, which is taken from Reference 4, gives software productivity for various broad categories of software. The table was compiled from historical data on a number of large projects.

Project Difficulty	Project Duration		
	6 Months	12 Months	More than 24 Months
instructions/man-month			
Easy (very few interactions)	400	500	800
Medium (some interactions)	200	250	400
Difficult (many interactions)	100	125	125

This table enables an estimate of program size together with a gross estimate of project duration and a broad categorization of the complexity of the program to be converted into total programmer man-days to complete the program. According to the author, productivity is largely independent of the language used when measured in terms of instructions in the language itself (i.e., *not* in machine language instructions). The estimates include allowance for all reasonable overheads such as holidays, training, sickness, etc.

b. **Formal estimating methods**

Alternative approaches to establishing estimates for program development time are discussed in detail in References 2 and 5.

The general principle used in both methods is to develop an unadjusted estimate for program development time taking into consideration such factors as size, complexity, number of files handled and the language used in the development of the programs. Consideration is then given to the experience of the programmer assigned to the task. Programmer experience is represented by a range of values. Each programmer is assigned a certain programming factor which represents how much faster or slower he is compared to an "average" programmer in the industry for a particular language. The product of the unadjusted estimate and the programmer factor gives the adjusted estimate for completion of that particular programming task.

Each EDP organization should develop loss factors to apply to man-day estimates to allow for overheads, such as administrative tasks, programmer turnover, program changes, unavailability of computer time, project control reporting, modification of utilities, etc. In addition allowance must be made for such items as training, vacation, holidays, sick leave, meetings, other assignments. The finally adjusted man-day estimates can be used to create the schedule for completion of the development phase. For large projects estimates may be input to a PERT or CPM analysis.

c. Summary

It should be reemphasized that good estimates rely mainly on the experience and judgement of the estimator. Structured estimation methods and rules of thumb can be of assistance in appropriate circumstances but determination of the appropriate circumstance itself requires experience. Each EDP organization should keep statistics of full project costs in order to develop the cost and overhead factors required above and as a means of improving estimating expertise. For projects which are particularly critical or contain new or experimental methods, several independent estimates should be made and compared. As with the analysis and design estimates, comparisons between in-house costs and comparable costs outside the organization should be made for some projects.

At the end of the design phase, detailed estimates for the implementation phase can be prepared. There is no formalized method available for making estimates for this phase. However at this stage of a project all requirements should be clearly established and documented, allowing sub-activities in the implementation phase to be established as well defined tasks. The project development and control checklist (Appendix IV-1) can be used to assist in identifying these activities.

For small projects, implementation is often so straightforward that the implementation phase is almost an activity in the development phase. However for large projects involving the integration of many software modules, and in particular for large on-line systems, the implementation phase can be a large percentage of the total effort and care should be taken not to underestimate it. Because this phase often requires close liaison with other organizations and existing systems, breakdown of the schedule can have more serious impact than in other phases.

4. Development and Implementation

During these phases, if the project is leading to an operational system, estimates of operating cost should be revised. Machine and other operating costs can be derived from system tests and estimated load volumes, but software maintenance costs must be estimated. Once again there is no formalized method available to supplement the knowledge of an experienced estimator. Keeping adequate records (by type) of projects developed in similar environments can assist in developing such experience. Software maintenance costs will arise from two main sources: software errors and requests for changes. The frequency of these and their impact will be dependent on nearly all aspects of the whole project development cycle. Some important considerations will be:

- degree of maintainability built into the system,
- familiarity of maintenance analysts and programmers with the system,
- standard of documentation,
- number of change requests accumulated since "design freeze",
- language used,
- programmer experience,
- stability of hardware configuration.

5. Summary

- The key to realistic estimates is the ability to relate past experience and results to future projects.
- Experience on one project cannot normally be related to others until it has been broken down into standard parts. This entails breaking projects into phases and then activities within phases, and breaking programs into standard modules (where possible).
- Estimates do not in themselves provide project control, but they are essential input to an effective project control system.
- If possible, those who will actually be doing the work should participate in the estimation activity.
- Experience in estimation can be developed, and hence estimates improved by keeping adequate records.
- Cost factors can be developed for each organizational environment by keeping adequate financial records.

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**DETAILED LISTING OF PROJECT DEVELOPMENT
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DETAILED LISTING OF PROJECT DEVELOPMENT AND CONTROL ELEMENTS

The detailed listing of project development and control elements which follows applies directly only to very large EDP projects. The list also assumes that the project in question is intended to replace or supplement an existing system. For smaller projects, or projects which have no counterpart in existence, those elements based on these assumptions are clearly no longer applicable. The reader should have no difficulty in selecting the elements which are relevant to his particular situation, and may also be able to add new elements of importance to his project.

A. INITIATION, PRELIMINARY ANALYSIS AND PLANNING

1. Initiation

This phase formalizes the identification and initiation of projects which arise from specific requests by users, functional authorities and systems groups. It is also the beginning of the progressive commitment process (i.e., commit only resources necessary at each project stage). The initial request will usually be received by a project leader or a senior systems analyst in the existing systems organization.

The importance of careful documentation cannot be over-emphasized and, with this stage, the organization of complete, cumulative documentation must begin.

Projects which are initiated in this manner should proceed through the following steps.

a. Documentation of first request

- Identify individual, branch, etc., for full background on source of request.
- Identify the problem to be solved in terms relevant to senior management.
- Identify possible solutions with very rough assessment of their advantages and disadvantages, in terms of their economic, technical and operational feasibility and possible side effects.
- Identify interrelationships with new, proposed or existing projects.
- Determine constraints (e.g., policy, legal resources, security, etc.).
- Formulate recommendation from working level regarding the preferred course of action.

APPENDIX IV-1

b. Report findings to user management

- If the findings indicate project status, and if a presentation is desired, it should be done jointly by user and technical representatives.
- The report and/or presentation should include all significant investigation findings and should bring out the systems group's professional assessment of the project's potential value to the department, and all departmental or interdepartmental ramifications as they are known at this time.
- An approximate implementation date should be stated, and a summary implementation schedule developed (including time, money and resource estimates for the Planning stage).
- It is important that the Project Review Committee be given an early opportunity to assess the project even if the supporting information is incomplete, so that valuable resources can be saved if the concept of the project is not in line with senior management's wishes.

c. Decision on Initiation

The Project Review Committee may:

- reject the project, or
- refer the problem to a maintenance group for changes to an existing system, or
- accept the project as an interesting idea worth pursuit into the preliminary analysis phase.

Where projects have been identified through departmental long range planning, and these projects have been formally agreed to at some point in time, project development will begin with Stage A.3, Planning.

2. Preliminary Analysis

The objective of the preliminary analysis phase should be to obtain approval in principle for the project (or its rejection) at a senior management level. The very brief analysis undertaken during the initiation phase is likely to have raised more questions than it supplied answers. The primary involvement of the preliminary analysis study team should be at the management and supervisory levels affected by the project. Extensive detail should be avoided.

As many of the existing special skills and knowledge (within or without the department) as are feasible should be made available to the preliminary analysis team. For example, if data capture and movement between locations is a consideration, or if the project impacts public records, central government agencies now charged with responsibilities in these areas should be invited to participate.

APPENDIX IV-1

Communication between the department's functional areas and the preliminary analysis team is vital, particularly with respect to changing circumstances which may affect the project's status. One effective way of providing two-way feedback is to have broad user/functional representation on the study team (including field representation in organizations with multiple locations).

a. Preliminary analysis activities

- Document interviews and refer summaries to persons interviewed, requesting review, changes and approval.
- Determine benefits and consequences which could arise out of project's impact, both quantitative and non-quantitative.
- Research problems in conceptual terms and identify user information requirements.
- Prepare summary work flow charts.
- Prepare charts of existing organization and identify possible departmental organization changes resulting from the project.
- Establish a list of system objectives, ranked by departmental priorities (should be directly related to the problems and requirements identified in the study).
- Examine make or buy alternatives for various phases and segments of the project.

b. Preliminary analysis reports

- Set out documented findings of study and recommendations.
- Provide solution alternatives and describe interrelationship with other existing and proposed systems.
- Support each solution alternative with a tentative project plan.
- Arrange to submit report and provide a presentation to Project Review Committee.

c. Decision on preliminary analysis

- The Project Review Committee may:
 - reject the project, or
 - refer the project back to the preliminary study group for re-examination of solution alternatives, or
 - accept the project on a conceptual basis and give authority to proceed to Planning.

APPENDIX IV-1

3. Planning

In this phase, the planning team should produce a complete definition of the problem and establish a full statement of system objectives acceptable to the functional management of the department.

The problem definition and statement of objectives, once agreed upon by functional management, should be complemented by an analysis team proposal and a project plan.

In general, the planning team should retain the same complement of skills and expertise that made up the preliminary analysis team.

a. Problem definition

- Verify reasons for action or causes of problems in all functional and user areas in department.
- Extend study coverage to external peripheral areas of project involvement (e.g., departmental operational research function, Statistics Canada, etc.) and if need be recruit personnel from these areas to assist team members.
- Weigh the importance of social, operational, technical, economic and political constraints in the examination of problems and requirements. Identify any security considerations.
- Document all findings including a confirmation of findings from earlier studies.
- Encourage functional/user team representatives to keep their management informed and maintain awareness of day to day changes in their operational areas which may affect the evolution of the problem definition.

b. System objectives

- Develop system objectives as straightforward, meaningful statements of team solutions. Keep the number of objectives to the minimum consistent with identified problems or reasons for action.
- Identify if and how the stated objectives may be in conflict with each other or with other departmental objectives and priorities.
- Determine time and cost factors of objectives in respect of both development and subsequent operation insofar as is possible.
- Set initial system evaluation criteria in statements of systems objectives. These criteria should include quantitative measures of expected achievements where possible.

c. Approval of objectives

- Present the problem definition and the system objectives to functional management.
- Functional management may recommend that the project be abandoned or deferred, and present these findings and recommendations to the Project Review Committee.
- Functional management may provide additional input on problem definition and conflicting priorities, and request a reversion to problem definition/system objective formulation, or
- Functional management may approve the statement of objectives and commit themselves to project continuation, in which case the planning team would proceed to the next steps in the system plan.

d. Project plan

- Identify activities and skill requirements, and develop project phasing-in schedule, accompanied by gross estimates of possible development and implementation target dates.
- Determine methods of progress reporting and project control (time reporting, PERT, GANTT charts, etc.), and state recommended scheduling.
- For very large projects it may be necessary to start identifying possible hardware and telecommunications requirements, although formal procurement action probably should not be initiated until a much later stage. While expertise concerned with EDP (and perhaps telecommunications, etc.) facilities should have been represented on the planning team, it is at this point that EDP and telecommunications procurement may begin to emerge as separate activities although with project team representation.
- Identify project segments to be contracted out and draw up a schedule for the procurement process in co-operation with DSS.
- Identify staff required in terms of level, numbers and activity assignment. Maintain functional, direct user and systems representation and add any other skills needed for Analysis stage (e.g., methods analysts).
- Present problem definition or statement of objectives and project plan to the Project Review Committee.

e. Decision on project plan

- The Project Review Committee may:
 - reject the project, or

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- seek independent advice (e.g., outside consultants or experts from other departments, etc.), or
- refer the project back to the planning stage to increase, decrease or modify the project's scope, or
- authorize undertaking the analysis stage with appropriate authority to acquire the necessary resources for staffing the analysis stage activities.

B. ANALYSIS

The analysis stage involves a re-examination of ground previously covered, in the initiation, preliminary analysis and planning phases. The analysis process, however, is carried out in greater detail than in the preceding phases which were concerned primarily with principles, concepts and overviews.

Notwithstanding the skills and knowledge within the project team, inevitably a number of analysis stage activities will take place in close liaison with, but outside the formal project organization (e.g., telecommunications, records management, hardware acquisition, personnel management).

This diffusion of project activities and the increasing level of commitment, with the resultant increase in the number of staff becoming involved with the project, makes the effective use of scheduling, control and communications techniques imperative. Whatever techniques are selected (e.g., PERT, CPM, time/progress reporting), they should be carefully followed without, however, precluding the possibility of modifying schedules where necessary.

Analysis is a large step down the path of progressive commitment, in terms of the detailed proposal which results and the significant increase in the level of commitment to be undertaken by management. The basic principles and objectives of the proposed system, firmed up during analysis, should be subjected to the most scrupulous examination and, if approved, they should remain unchanged during succeeding stages (barring major legislative or policy changes).

1. Analysis of Present System

This is the first in-depth examination of the present system. It will, therefore, probably uncover operational level considerations which had not surfaced in previous phases. The examination should scrupulously explore every facet of the present system and not just those areas directly related to identified problems.

a. Present system description

- Identify and record systematically the work flow in the present system. (Refer to procedures manuals, forms, file descriptions, work standards, etc.).
- Prepare detailed work flow process chart of present system including EDP components, if any.

- Verify and expand, if necessary, the organization charts prepared in the Planning phase.

b. Present system diagnosis

- Identify any present processing entities where time or cost may be disproportionate to benefits.
- List those events which account for processing time, in descending order of significance.
- Explore processing events which could lend themselves to consolidation with new or existing requirements.
- Examine allocation of resources in relation to work flow and record any imbalance.
- Take cognizance of any system events which are efficient and effective.
- Relate present system controls to frequency and severity of potential errors.
- Examine present system efficiency in the light of externally applied processing constraints.
- Examine if and how exception processing is being applied (above or below limits).

c. System objectives analysis

- Relate performance of the present system to the proposed system objectives as established in the Planning phase.
- Evaluate elements of the present system which, through modification, may be capable of meeting system objectives (areas of opportunity).
- Restate principal system objectives, if required as a result of present system analysis. This requires a resubmission to functional management before proceeding.
- Stabilize system objectives in preparation for the development of design guidelines.

2. Design Guidelines

Design guidelines, as they are developed by the analysis team, will serve three purposes: first, they provide system specifications in sufficient detail to support the hardware acquisition process if required; second, they provide terms of reference within which the design team will be expected to develop the detailed system specifications; and third, they provide greater insight into the

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proposed system for the time that the Project Review Committee again considers the project at the conclusion of the analysis stage. It is usually desirable to involve senior programming personnel in the development of these guidelines, and in subsequent design work.

a. **Design guideline criteria**

- *Costs* — of development, operating, maintaining.
- *Time* — response, access, cycle turnaround, processing.
- *Reliability* — down time, expected useful life, failure rate.
- *Accuracy* — error rate, errors per day or per cycle.
- *Equipment Use* — extent to which system may monopolize facilities when running, or waste facilities due to instability.
- *Capability* — average and maximum loads, saturation levels.
- *Quality* — appearance of output, output rejection rate, acceptable complaint rate.

b. **Scope**

- Determine whether the proposed system will become fully operational in a single stage, fully operational on a limited, pilot basis, or be introduced in several stages.
- Establish schedule for reaching full operational status.
- Interface with EDP planning, suppliers, departmental systems support and, if necessary, telecommunications network experts, to arrive at decisions on the role each is to play (e.g. custom-built system delivered on "turn key" basis by suppliers, system developed co-operatively by suppliers and departmental team, or developed entirely "in-house").
- Identify and document the features and important system characteristics, and set *quantitative* design limits which the system will be expected to satisfy or adhere to.
- Prepare preliminary system process charts.
- Balance and rank multiple design guidelines applicable to any portion of the system where they are in conflict.

c. **Organizational impact**

- Describe organizational impact in terms of both the numbers and levels of personnel who may be displaced and additional manpower requirements.

- Outline retraining needs of displaced personnel as well as training requirements of additional staff in the operation of the new system in all areas (personnel management involvement).

d. **System performance criteria**

- Assemble potential system performance indicators identified in previous activities, and document in a manner that will provide a basis for the development of evaluation criteria in subsequent stages.

3. **System Technology**

From early in the planning stage, the EDP planning group has been actively involved with hardware considerations. Even if the system is to be run on existing equipment, it will be necessary to determine anticipated hardware utilization and the software and technical support which must accompany it. The system should be sufficiently defined to permit the final development of specifications for tenders and to make other technical decisions. It should be remembered, as stated earlier, that many of these technical activities overlap project development activity, and must be carried on in parallel. This is also the time when the group that will ultimately be responsible for site preparation must become actively involved.

a. **Data preparation — sample alternatives**

- Keypunching.
- Optical character recognition.
- Punched paper tape.
- Direct entry via centralized/remote terminals.
- Videotape.
- Microfilm.

b. **Equipment characteristics**

- Receive and convert data.
- Process data.
- Store data (magnetic tape, disk, etc.).
- Transmit data.
- Display data.

c. **Data transmission — sample alternatives**

- Paper.
- Punched paper tape.
- Magnetic tape.
- Telex.
- Telecommunications network.
- Microfilm.

d. **Software considerations**

- Select operating mode (batch, remote batch, time sharing, etc.).
- Consider stability of normal programming languages.

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- Describe support utilities (either separate programs or additions to operating system, to perform common functions for all programs).
- Determine and document inter-program or inter-computer compatibility requirements.
- Determine relevant federal government EDP standards and assess their likely applicability (see Chapter XI).

e. Hardware acquisition

- See Chapter VI.

f. Hardware installation considerations

- Space (construction/modification).
- Environment (power, air conditioning, pollution, vibration, site preparation, etc.).
- Location (hardware, data and file security).

4. Design and Development Team Proposal

When the design and development team proposal is considered, a primary management concern should be the type of project organization to be adopted for the design and development stages. For example, a decision must be reached as to whether a single project group will address design and development, whether parts or all of various activities will be farmed out to in-house systems groups or, possibly, contracted for outside the department.

The design and development proposal should include a list of the tasks appropriate to the design and development stages and establish manpower requirements in all skills for both stages.

5. Analysis Stage Milestone

The importance of the presentation at this stage is underlined by the fact that it is the last planned decision milestone for the Project Review Committee before the Implementation stage. Consequently, since it entails the largest commitment to the expenditure of money and manpower, it imposes the need for an in-depth exploration of all the ramifications implicit in the proposal.

External agency endorsement may be required for portions of the proposed system which relate to activities for which those agencies are responsible (e.g. Government Telecommunications Agency, Public Archives).

The Project Review Committee may:

- terminate the project, or
- defer the project, or
- direct further analysis, or
- approve the project for design and development.

C. DESIGN

The degree of direction and control exercised over the multitude of inter-related activities undertaken in this and following stages will have a direct bearing on the measure of success the new system will have in attaining the goals and performance standards envisaged within proposed time frames. Therefore, control procedures, lines of authority, direction and communications, both within and among activities, should be enunciated and enforced.

Because practically all systems evolve over time, it is of the greatest importance that the system be designed so that it can easily be altered. This flexibility is usually best achieved by breaking up the system into independent modules with well defined input and output parameters.

While quantitative forecasts and measurements are subject to many variables (e.g., types of applications, equipment utilized, programming languages, etc.), there are disciplines which can enhance the performance of systems personnel and thereby facilitate the forecasting of project activities. These disciplines are a collection of rules, procedures and practices (most commonly referred to as standards) which instruct and govern EDP personnel. For example, flow chart standards, preparation of specifications, conventions, coding standards, operational controls, testing standards and documentation rules are all disciplines which can greatly assist in the difficult task of maintaining good communications among different groups and individuals either working on the project or with managerial responsibilities. While the creation of standards is normally an evolutionary process, they can be acquired from other organizations and adapted to a department's particular needs. Departmental standards are usually desirable in many areas not covered by federal government, national or international standards, but should be compatible with these more general standards. There will, however, be cases in which both departmental and broader standards must be adapted or altered to meet real needs or technological innovation.

Management's acceptance of design guidelines implies a degree of "system freeze", and the design team should be protected against the constant stream of requests for change to which any system is subject. This does not, of course, preclude the possibility that changes may be required in the light of shifts of objectives or changes in policy or legislation. Similarly, the design team should consciously avoid the inclination to continually "design and redesign", beyond the point where detailed design has satisfied system objectives; there will be ample opportunity, once the system is operational, to tune, change and generally enhance the features of the implemented system. Furthermore, at this later time, a much better perspective on the relative importance of proposed alterations can be obtained.

1. Detailed Design and Documentation

a. Define outputs

- Completely define all data expected out of the system, including output systems record definitions and sort specifications (possible records management involvement).

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- Design output formats and related forms (availability of output forms for use in testing phases is desirable).
 - Provide for error handling routines.
 - Decide on internal and external output controls, e.g.:
 - financial accounting,
 - statistical checks,
 - system monitoring.
 - Describe requirement in output handling areas.
- b. **Define inputs**
- Completely define all data required as input and check that it is consistent with output requirements.
 - Design input forms (availability of these forms at test time is desirable).
 - Develop input preparation instructions (keypunch, OCR, etc.).
 - Document input systems record definitions and sort specifications.
 - Define input validity checking routines, both manual and automatic, and develop external and internal input controls.
 - Chart flow process for input handling areas.
- c. **Define process**
- Define data base management requirements including data base structure.
 - Outline the sequence of processing as it applies to hardware and program execution.
 - Develop initial program design with the assistance of senior programming personnel who will ultimately be responsible for program development, with full consideration for the advantages of modularization.
 - Design data processing logic (decision tables, logic charts, etc.).
 - Define requirements for checking validity of transaction and master file records, and error handling routines.
 - Co-ordinate external and internal controls on processing with input/output controls.

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- Determine transaction priorities and set processing sequence.
- Specify adequate file security and back-up and recovery procedures.
- Determine the location and design of checkpoint routines which will permit easy restart in the event of equipment failure.

d. Manuals and procedures

- Invoice user/functional team members in the design and development of procedures manuals and work standards as applicable.
- Identify training requirements in manual processing areas.
- Initiate acquisition of any special office equipment (calculators, posting machines, endorsers, etc.).
- Develop any special or modified EDP standards required by the project. Discuss any likely departures from Treasury Board Approved or GESC Recommended EDP standards with the Treasury Board Secretariat or the Government EDP Standards Committee (see Chapter XI).

e. Conversion requirements

- Identify requirements for the conversion of all or parts of existing EDP files, paper-based files, or both.
- Develop conversion schedule.
- Develop conversion input, process, validity checking, error handling and output specifications. The conversion process could require extensive logic and program design in itself.
- Develop procedures for conversion.

f. Parallel operation considerations

- Investigate the advantages of parallel operations (i.e., old system running in parallel with new system) in light of:
 - feasibility,
 - desirability,
 - initial system back-up and recovery needs.

g. Pilot operation considerations

- Investigate the advantages of pilot operation (i.e., complete new system running on a reduced scale).

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2. Evaluation Procedures

Evaluation is a critical phase of any project. In order to obtain maximum benefit from the evaluation it is important that an overall evaluation plan be prepared during the planning phase of the project and critically reviewed and approved by the Project Review Committee. During the design phase the evaluation criteria should be further refined, and evaluation procedures should be developed.

Both the evaluation plan and procedures should make clear what constitutes minimal acceptable performance and what constitutes expected performance. Wherever possible, procedures for the evaluation of individual system modules as well as the system as a whole should be developed.

In order to avoid argument and recrimination between the ultimate system user and the system developer, it is important to define evaluation criteria before development and implementation of the system.

3. Technical Considerations

The hardware acquisition process, if applicable, begun in Planning and culminating in tender specifications after Analysis stage decisions, should now have reached the point of final hardware selection. If the hardware/software facilities are not definitely established, certain design activities, and all of the development activities will be delayed. As a corollary, control and scheduling functions acquire ever more critical importance in relation to the final selection and delivery process.

This is also the time to review standards on programming, testing and documentation procedures once more and to establish a quality assurance group to monitor EDP development processes, if this is not already established as part of the departmental EDP organization.

a. Hardware/software

- Complete the selection of computer and/or telecommunications facilities.
- Identify hardware/software impact on detailed system design (program structure, batch, on-line or blended processing).
- Identify in-house software requirements (operating system, utilities, etc.).

b. Hardware installation

- Undertake site preparation.
- Schedule hardware installation to allow time for supplier shakedown of equipment.

- Arrange with computer operations for temporary off-site computing facilities, if required, for program development until on-site hardware is operational.

4. Development and Implementation Proposal

The implementation schedule will be directly affected by the organization's work cycle. It should be quite clear at this point when this cycle will either permit or dictate conversion to the new system and these factors should be carefully weighed when the implementation schedule is developed.

It should now be possible to study the new system's impact on operational staff and, therefore, to develop a plan for dealing with these effects immediately after design and development stage decisions have been reached.

a. Development and implementation schedule

- Detail organization of development and implementation stage teams (numbers, skills and levels required, and how activities are divided among teams/groups).
- Prepare timetable for development and implementation stages which is consistent with the work cycle and installation schedule.

b. Conversion impact on manual areas

- Detail immediate and long-term effects (e.g., immediate conversion workload and staff effects vs. continuing workload and staff effects) to permit effective departmental action.
- Complete details of manual area budget, staffing and training.

5. Design Stage Milestone

This milestone requires a formal, detailed presentation in order to demonstrate to functional management how well the design team's proposal meets the pre-defined system objectives. A thorough, in-depth, examination of the proposed system will help functional management to support the system "freeze" (barring major policy or legislative changes) during the development and implementation stages.

D. DEVELOPMENT

In order to keep development and implementation stages on schedule, it is incumbent on the organization as a whole to support and enforce the system "freeze" within the limits previously stated.

During the development and implementation stages project activities are likely to be diffused through several organizations. Consequently, project control, conscious communication and firm direction are likely to be key ingredients to progress.

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As an initial step, the development and implementation team should complete the assignment of all activities in order to verify that the development and implementation schedule can be maintained. In the event that adequate resources are not immediately available, the situation must be referred to appropriate departmental authority for resolution.

1. Quality Assurance

- Implement programming, documentation and system standards.
- Consider the use of commercial program evaluation packages (e.g., PPE, CUE, compiler optimizers).

2. Programming

- Develop program design.
- Prepare block diagram (if used prior to coding).
- Resolve disparities between design specifications and practical program requirements and validate input/output specifications.
- Code.
- Test programs progressively (from initial test of single segments and modules through extensive tests of complete programs and all programmed conditions).
- Maintain log of program/logic problems encountered for reference and control.

3. System Testing

- Test system progressively (from low volume to full scale pilot test of system).
- Involve user in preparation of input and in examination and evaluation of output results. (Provides opportunity for user training and orientation).

4. System Documentation

a. Operating documentation

- Set-up and operating instructions for computer operations area.
- Process charts for graphic indication of inter-program relationships within system.
- Estimates of program running time.
- System and program cycling (i.e., frequency of operation).

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- Master and transaction file retention periods, and back-up provisions.

- System maintenance support (programmer call list).

a. Input/output documentation

- Cutoff times/dates for both conversion and operating input.
- Cycling periods and cutoff times for error correction.
- Output distribution instructions.

c. Standards documentation

- Specify all relevant Treasury Board Approved and GESC Recommended EDP standards, and define any exceptions.

5. Technical Considerations

a. Compiler and utility requirements

- Program compilers for all languages in use.
- Tape converters to accommodate inter-computer and inter-system compatibility.
- Language converters for programs which may need to be converted for use in a new system.
- Data conversion programs may be required either for one time conversion or for continuing communication between different systems.

b. Develop data base support (if applicable)

- Organization of data base.
- Interface with application programs.
- Data base maintenance procedures to keep users up-to-date.

6. Manuals and Procedures

- Review and revise manuals and procedures (cf. C.1.d).
- Maintain close liaison and interaction between development of the computer system and manual operations, in order to achieve effective integration of total system.

7. Training Program

- Decide on user training material for both conversion and operation.
- Decide training schedules and methods (i.e., on-the-job, classroom, seminar, audio-visual aids, etc.).

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- Take advantage of training to inform all departmental units of system features and "sell" the system to users.

8. Evaluation Process

- Use the evaluation procedures to monitor the performance of the system during volume testing and/or pilot testing.
- Review findings with development team where performance is sub-standard.
- Review the established evaluation criteria. Any revisions to evaluation criteria or procedures should be approved by the Project Review Committee.

9. Development Stage Milestone

Notwithstanding the amount of time and money expended on the project up to this point, the possibility of rejecting the project entirely at this time should not be excluded. The future cost of operating and maintaining an inadequate system could far exceed the costs already incurred.

a. Present design and development stage results

- Evaluate any variations from objectives since Analysis stage approval, arising from Design and Development stages.
- Express the design and development team's professional judgement on the system's potential for satisfying objectives.
- Review results of "test phase" evaluation as viewed by the evaluation committee.

b. Design and development decisions

- The Project Review Committee may:
 - terminate the project, or
 - defer the project, or
 - direct further design/development work, or
 - approve the project for implementation.

E. IMPLEMENTATION

In this phase, having received management's authorization to implement the system, the project team will proceed to bring their system into operational status. The team, with management support, should suppress the natural inclination to accelerate the implementation schedule in favour of a more deliberate and controlled approach. Otherwise, serious harm may be done to the user's confidence and unjustified criticism may accrue to the whole development effort.

1. Conversion**a. Conversion and initial operation**

- Convert or generate data files as required and protect source base from premature destruction.
- Purify data entering base files.
- Scrutinize results of conversion process before accepting base files for use in operational mode.

b. Switchover or initiation

- Resolve initial operating problems to the satisfaction of users before placing system in maintenance status, *or*
- Consider pilot or parallel operation until significant problems are resolved (retain development staff for this period).

2. User and Operator Training**a. Initial user training**

- Implement training plans.
- Overlap training with conversion period.

b. Operator training

- Complete operator training during conversion and initial system operation.

3. Handling of Discrepancies

Discrepancies can take many forms. Examples are program bugs, hardware problems, errors in the original specifications and changes in user requirements since "system freeze" which make some part of the original specifications either undesirable or unacceptable.

a. Notification of discrepancies

- Establish "notification network" for feedback from user/functional personnel, machine operators, public, etc.
- Use those external agencies which have assisted in the project to discover and report discrepancies (telecommunications, etc.).

b. Identification and correction

- Analyze discrepancies to determine cause(s) and location(s) in system.
- Investigate possible domino effects (e.g., single discrepancy causing multiple discrepancies, etc.).

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- Undertake corrective action.
 - Document corrective action.
 - Continue process until discrepancies are minimized.
- c. **Transfer system to maintenance status.**
4. **Evaluation**
- Apply evaluation procedures and evaluation criteria to the operating system.
 - Analyze evaluation results.
 - Identify deviations from criteria.
 - Request corrective action where warranted.
 - Continue evaluation process until system performance is within established or accepted tolerance levels or write up failure report. Recommend periods for operational reviews.

5. **Post-Implementation Review**

Once implementation has been effected, the new system has been run in and evaluation is complete, a post-implementation report should be prepared for the Project Review Committee. This report should indicate areas where the new system has either fallen short of or exceeded the original objectives, and provide an assessment of the original objectives. Any lessons learned which could usefully be applied to future projects should also be described.

Chapter	V
Date	August, 1974

GUIDE ON EDP ADMINISTRATION

CHOICE OF EDP SERVICES

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APPENDICES

- V-1. MODEL STATEMENT OF STANDARD ASSURANCES OF SERVICE AND CONDITIONS OF USE
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DIRECTIVES

- 3.1 Departments and agencies shall acquire EDP services to support their programs from or through a service-wide application centre, if such centres provide suitable cost and program effective services. Other EDP services shall be obtained from the private sector through the normal procurement process unless:
 - (a) the department or agency is associated with a departmental or functional centre designated in the EDP Master Plan, and the centre can provide appropriate cost and program effective service; or
 - (b) the service can be effectively supplied by available in-house resources or from surplus government capacity.
- 3.2 The Information Systems Division of the Treasury Board Secretariat shall provide the EDP Branch of the Department of Supply and Services and potential users with information on the availability of surplus capacity or unique EDP capabilities within the public service.
- 3.3 Users of service-wide application centres, functional or departmental centres shall be allowed to transfer any part of their business elsewhere through the normal procurement process if a centre does not provide program and cost effective service. Each centre advisory committee or board, or the equivalent body for departmental centres, shall define any conditions under which its approval should be obtained before business which would normally flow to the centre is contracted elsewhere. If a department considers that approval to transfer business is unreasonably denied by a centre, the problem may be submitted for arbitration to the Information Systems Division of the Secretariat.
- 3.4 The approval of the Treasury Board shall be obtained before there is any diversion of business from an existing supplier which effectively destroys an alignment which is an integral part of the Master Plan, or creates a new alignment not recognized in the Master Plan.

GUIDELINES

- 3.5 Centre directors should inform the EDP Branch of the Department of Supply and Services, on a regular basis, of any surplus capacity, unique capability or expertise that they are interested in marketing within the government sector.
- 3.6 The departmental EDP adviser (or equivalent) should examine each existing or proposed EDP project to determine whether it relates to an existing service-wide application centre; if so, arrangements should be made with the SWAC director to review the project and obtain the required service.

- 3.7 Standard assurances of service and conditions of use, under which all authorized users can receive equal service at standard prices, should be established for each EDP centre or large common-service EDP staff by the appropriate policy advisory board, committee or equivalent.
- 3.8 A specific memorandum of agreement should be substituted for the standard assurances and conditions whenever either the user or the centre director (or equivalent) believes it desirable because of the volume of business or the special or critical service requirements of a particular project. Each such memorandum should be reviewed by the appropriate policy advisory board, committee or equivalent.

A. INTRODUCTION

The purpose of this chapter is to define and clarify the degree of choice open to departments in acquiring EDP services to support their programs, and to outline some general practices which will help ensure effective EDP service. It is assumed that feasibility studies have demonstrated that the use of EDP will be more cost or program effective than the use of alternative methods. This chapter does not attempt to identify detailed procedures which will aid the choice of EDP service; some guidance on procedures is contained in Chapter VI (Procurement of EDP Goods and Services).

One basic objective of Treasury Board EDP policy is to ensure that EDP equipment and services are obtained from the private sector except when it is more cost or program effective to provide services within the government. The EDP Master Plan designates those instances in which government services are considered likely to be effective, and the Information Systems Division of the Secretariat monitors the general cost and program effectiveness of these services. Their continued existence normally implies a generally satisfactory level of effectiveness. This is the basis for directing that the relationships prescribed by the current edition of the Master Plan be given first consideration when EDP services must be acquired.

It is also a policy objective that government EDP services should be used to the maximum extent consistent with program effectiveness. Centre directors should keep the EDP Branch of the Department of Supply and Services informed of any surplus capacity, unique capability or expertise that they can offer for use within the government sector while still providing effective service to their clients as defined in the Master Plan, and of the conditions and prices at which they wish to market this surplus capacity. The Information Systems Division of the Secretariat will also review the extent of use of government facilities. User departments shall not be required to utilize surplus capacity unless it is both program effective and no more costly to them than the use of another source. It may be necessary to set special rates for each use of surplus capacity as described in Chapter VII, sub-section C-2-b (job pricing).

Neither the relationships prescribed in the Master Plan nor the objective of full use of government EDP resources is intended to impair the EDP user's responsibility to ensure that his program is implemented in an effective and efficient manner. His ultimate right to transfer his business from an EDP supplier who does not provide satisfactory and cost effective service must be respected, and this right should be an effective spur to maintain efficiency among suppliers of EDP services to government programs. The right to transfer business from one supplier to another (including transfers among suppliers in the private sector) must be used carefully in order to minimize the danger of destroying any usually satisfactory and viable supplier of EDP services.

B. ALTERNATIVE SOURCES OF SUPPLY

It would not be practical to provide a single set of procedures which would always ensure the choice of optimum EDP services. The considerations vary with the type of service required, the characteristics and time frame of the particular program serviced, the availability of alternative suppliers, and even with the level of EDP capability or sophistication in the user program staff. Lists of factors which apply in particular cases are included in Chapter VI. This section is limited to enlarging on the process of choice among the institutions outlined in the Master Plan which, at this stage, is largely concerned with the provision of machine services. The discussion assumes the availability of a knowledgeable EDP adviser as described in Chapter III, to assist the user as required in selecting a source of supply.

1. Service-Wide Application Centres (SWACs)

It is not departments and agencies, but rather specific projects within departments, which are aligned to SWACs. As SWAC services become available, this chapter will be updated to reflect these services. At this stage, potential SWACs can be classified in two groups:

- *Service-oriented (Library/Scientific/Text-Editing/Econometric)* — These will provide a class of service to government users, but have no distinct function of their own. It is expected that a departmental EDP adviser will poll these centres as the service point of first choice for the specialty service offered.
- *Function-oriented (Personnel/Financial/Inventory)* — These centres service a need for centrally aggregated information in a specific field. Departments must report the basic information that these centres need, but these centres will not always service departmental *operational* requirements in their functional area. They will, however, offer services which departments may wish to use.

One of the first tasks of the departmental EDP adviser will be to examine existing and proposed EDP projects to determine any likely relationship to an existing SWAC. This review will have to be repeated from time to time as additional SWACs become active or the services of existing SWACs are extended. When a project does not relate to a SWAC, then service can be obtained as outlined in subsequent sections. However, should an existing or planned project

be oriented to an existing SWAC, the departmental EDP adviser shall arrange for a discussion with the SWAC director regarding the requirements of the project in terms of the current and expected level of systems activity.

Systems which are at the initiation and planning stage will yield less concrete conclusions than those at more advanced levels, but it should be possible for the centre director to determine whether a relationship does exist and for all parties concerned to conclude whether the system requirements and related policy commitments can be met. If the results are inconclusive, there should be a joint presentation by the centre and the department to the policy advisory committee of the SWAC, which will formulate recommendations concerning the project to the deputy head of the department involved.

In conducting these reviews, the EDP adviser must bear in mind that SWACs do not necessarily provide services directly, but may act as agents to assist in placing government business falling within their sphere of activity.

2. Functional or Departmental Centres

The shared use of machine and human resources will usually provide a basic economic justification for functional and departmental centres. There is a second and often more important objective for such centres: to catalyze user communications and promote the sharing of relevant techniques, software and data. This objective must be kept in mind in the selection of EDP service sources, and in the organization of a centre to provide EDP services.

It is expected that participants in a functional centre will jointly approve an overall integration plan. As a likely first phase, departments will evaluate all relevant machine services in terms of their feasibility for transfer, and will commit and transfer all practicable machine services to the centre. Services which are not suitable for integration will form part of an "exclusion list" approved by the centre director and the departmental EDP adviser. After this initial phase, the degree and speed of further integration will be a matter of negotiation between the centre and its users, and will depend on the success and confidence engendered by the centre.

Departments which participate in a functional centre should determine whether necessary human resources (for systems study, development and implementation) can be provided from their department, their centre, or from one or more of the partners within their existing alignment. Arrangements for the provision of service by a centre or a partner should be negotiated and covered by a memorandum of agreement, or covered by a statement of standard assurances of service and conditions of use. For departments with their own centre, it is likely that sufficient functional and technical expertise will be available within the department to undertake or participate in the system study and system development activities. Even so, it is essential that in undertaking such activities a clear specification of requirements be prepared and used as the basis for agreement between the user and the departmental centre.

Users of either functional or departmental centres should notify their centre director of anticipated machine requirements and give him the opportunity to evaluate the capability of the centre to satisfy these needs. Should the required service not be available from the centre, or if during the course of providing service the centre proves to be an ineffective supplier, then the user (or his EDP adviser) is responsible for seeking other sources of supply. In either case, it will be necessary to consider the use of suitable identified "surplus" government capacity before proceeding to acquire services through the procurement process. (Consideration of "surplus" capacity should also precede procurement in the case of human resources).

3. Departments with Multiple Alignments

In the case of departments which (under Treasury Board policy) are aligned to more than one centre, the EDP adviser shall direct projects to that centre which most suits the characteristics of the project.

4. Regional Users

It is expected that regional users will ask their EDP adviser to determine whether they can economically utilize existing aligned resources. Failing this, any evaluation should include local in-government surplus capacity.

5. Private Sector Resources

Departments which are not aligned to any departmental or functional centre, or which require resources not available from their centres, will normally satisfy their needs from the private sector through the procurement process. The chief exceptions are:

- projects related to service-wide application centres, which will usually be directed to those centres;
- projects which can make effective use of the functional and/or technical expertise, and surplus capacity available within the government service.

C. SCOPE AND CONDITIONS OF SERVICE

The first task faced by the policy advisory board or committee of any EDP centre is to define the scope of services to be offered, the conditions under which they will normally be offered, and the standards of service which a centre is to provide. These should be codified in a statement of standard assurances of service and conditions of use, and made available to all users of centre facilities, together with a schedule of the prices at which facility use will be costed. This statement, and its accompanying price schedule, should be designed both to prevent misunderstandings between a centre and its users, and to provide a standard against which actual performance can be measured.

A model statement for a centre providing only computer services is attached as Appendix V-1. This model should not be regarded as a "standard" statement since assurances and conditions will necessarily vary from one centre to another. The model statement has been drafted in a semi-commercial style; readers should note that statements of hope or intent do not always provide guarantees of performance.

When centres provide a wide range of services it will usually be desirable to provide separate statements of conditions of use and assurances of service for at least its principal services. At the outset this is more likely to be true of departmental centres than of functional centres or SWACs.

Whenever either the user or the centre director believes that the volume of business or the service requirements of a particular project are such as to make special arrangements desirable, a specific memorandum of agreement should be substituted for the standard assurances of service and conditions of use. Such memoranda should spell out all components of an agreement believed to be important by either party, including:

- the nature and volume of processing to be performed,
- any special scheduling or data control requirements,
- delivery dates or times for input and output,
- the consequences of tardiness by either party,
- back-up and security arrangements,
- arrangements for termination after notice,
- any special pricing or billing arrangements.

All memoranda of agreement should be reviewed or ratified by the centre's policy advisory board or committee, since they may involve discriminatory treatment of different centre users, or limit the centre's ability to live up to its standard assurances of service. A sample memorandum of agreement for computer processing is provided in Appendix V-2.

The standard conditions and any special memoranda of agreement will provide a pre-defined standard against which a centre's performance can be rated both by its users and by its policy advisory board or committee. They also provide a basis for assessing user complaints of unsatisfactory service. The memoranda of agreement provide the centre with some protection for a major part of its workload. This will help to define the likely level of facility use, and therefore to indicate the level of operations likely to produce satisfactory financial operating results.

D. CHANGES IN ALIGNMENT

The usual sources of supply of EDP services specified in the Master Plan (including the private sector for those departments not aligned to departmental or functional centres) need not be used when:

- a user is not receiving satisfactory service as defined in memoranda of agreement or standard assurances of service;

- a user is able to demonstrate that more cost or program effective service can be obtained elsewhere.

It will usually be in the user's interest to proceed with caution in transferring business. He may receive equally unsatisfactory service elsewhere, especially if his expectations are unrealistic or inconsistent with the "state of the art". He may be misled by a competitor's presentation of costs or service conditions. In this situation the role of an EDP adviser can be of critical importance in providing a professional appraisal of service actually received or likely to be obtained elsewhere.

An alternative source of supply might be tested by transferring a thoroughly debugged on-going application which has not been well served by its current supplier, or by developing a new application at the alternative facility. All aspects of service at the alternative facility should be thoroughly reviewed; both those on which the previous supplier has a satisfactory record as well as those on which his record was unsatisfactory.

The policy advisory board or committee of any EDP centre should give early consideration to defining any conditions which should be met before business which would normally flow to the centre under the Master Plan may be directed elsewhere. In cases where diversion of business would not affect the viability of the centre, these conditions should not be stringent, nor should they impose unreasonable delays before an unsatisfied customer can resort to the procurement process. In cases where a proposed diversion of business is large enough to threaten the survival of a supplier, or to destroy an alignment which is an integral part of the EDP Master Plan, the diversion should be the subject of a submission to the Treasury Board.

Policy advisory boards and committees may also wish to consider a statement of conditions for joining their centre, which would set rules for the addition of new functional partners or the establishment of additional services. However, any change in centre alignments which would have significant effects on the EDP Master Plan should receive Treasury Board approval, either in an annual revision to the Master Plan or by a special submission.

**MODEL STATEMENT OF STANDARD ASSURANCES
OF SERVICE AND CONDITIONS OF USE**

1. SERVICES AVAILABLE

a. Computing

The EDP Centre provides computing services from 8 a.m. until 6 p.m. each working day, and from 9 a.m. to 5 p.m. on other days, on an XYZ computer operated in multiprogramming mode. The operating software in use is identified on the notice board in the work reception area, and plans for changes in operating software are also described on the board.¹

Any authorized officer of a department which has a service order on the Centre may submit any program to the computer without special arrangements, so long as none of the following limits is exceeded:

- 30 minutes CPU time,
- 2,000 K bits main core storage,
- 20,000 K bits direct access storage,
- 6 tape drives in use concurrently,
- 3 reels of data input from tape,
- 20,000 cards of input,
- 50,000 lines of printed output, standard character set (or equivalent).

Arrangements for programs having more extensive requirements may be made with the Service Manager.

b. Terminal services

The computer may be accessed by typewriter terminal or reader-printer terminal as well as over the counter. The Centre will, on request, supply terminals and make arrangements for line connections on behalf of Customers. Customers wishing to access the Centre from Customer-owned terminals should make arrangements with the Service Manager.

1. Or "in the EDP Centre Users' Manual", or "on each printout".

APPENDIX V-1

c. Software services

The Centre makes available to Customers current versions of the manufacturer's COBOL, FORTRAN and AAA compilers, and the manufacturer's SORT and BBB programs. Other manufacturer's software will be made available whenever there is sufficient demand and the Centre is satisfied of its reliability.

The Centre also makes available the CCC program for XXX, and the DDD program for YYY. These utilities are further described in the EDP Centre Users' Manual. Other utilities will be made available whenever there is sufficient demand and the Centre is satisfied of their reliability.

d. Pick-up and delivery services

The Centre provides a free pick-up and delivery service every working day, with two scheduled calls on each customer each day, and additional calls by arrangement or when required by the volume of work.

2. ASSURANCES OF SERVICE

a. Stability

The Policy Advisory Board of the EDP Centre has made stability of service a prime objective. Every effort will be made to ensure that changes in hardware or software (including utilities) are fully transparent to all users, and when this is not possible Customers are guaranteed a minimum of 90 days' notice of any changes to which they might need to adapt. The same notice period applies to all changes in the price of Centre services.

b. Turnaround²

The job turnaround provided to Centre users depends on the resources required by their job and the urgency of their need. *Standard* service provides job turnaround within the longer of 1 hour or 20 times the amount of CPU time estimated to be required or used by the job. *Express* service provides job turnaround within the longer of 15 minutes or 10 times the amount of CPU time estimated to be required or used, in return for a one-third surcharge on normal computing rates and a minimum charge of \$5.00. *Oversight* service provides job turnaround by 9 a.m. of the next working day for any job submitted before 6 p.m., and is provided at a one-third discount from normal rates.

With any class of service, users may elect to pick up their job at the Centre, receive it over their terminal, or receive it on the next scheduled free delivery following completion of the job. To ensure uniform application under these varying conditions, turnaround is defined as the time which elapses from receipt of the last unit of data or instructions at the computer centre, to the time when the first line of final output is printed on-site or via terminal.

2. Turnaround standards can be set in many ways, from a simple scheme such as that described, to a "first in, first out" scheme with priorities and discounts, or an elaborate scheme based on job classification by priority and resource requirements.

c. Accuracy

Every effort is made to ensure the proper functioning of all equipment and software installed by the Centre, and the proper handling of all information submitted for processing. If invalid job results are caused by the malfunction of equipment or installed software or by operator errors, no charge will be made for the job. The Centre can not guarantee the user's own software nor the data provided for processing. Unless the Customer orders special handling and provides adequate instructions and controls for checking of intermediate results, the Centre can not guarantee the adequacy of data passed from one stage to another of multi-stage jobs.

d. Back-up

The Centre maintains arrangements for the processing of Customer jobs at other facilities in the event that its own facilities become disabled or overloaded. Whenever such conditions are expected to exist for more than 4 hours, customers will be notified. They may either allow the Centre to arrange alternate processing at cost³, make alternative arrangements for their own processing, or withhold their work until the problem is remedied.

e. Penalties

In the event that the Centre does not provide the job turnaround which a user has requested and is entitled to receive, the rate charged shall be the rate applicable to the standard of service actually provided, less a discount of 10% for each turnaround unit or part thereof by which performance is degraded. A turnaround unit is the maximum time allowable for properly requested turnaround under the terms of clause 2(b). This penalty shall not apply to work submitted from the time that a Customer is notified that Centre facilities have been disabled or overloaded, until normal service is restored.

3. CONDITIONS OF USE**a. Programs and data**

The Customer is responsible for the accuracy and processability of all job control instructions, programs and data supplied to the Centre for processing, and for any charges incurred as a result of errors in or unsuitability of job control instructions, programs or data.

b. Authorization of processing

The Customer is responsible for notifying the Centre in writing of any limitations he wishes to apply to the use of Centre-site facilities, programs and data files by his officers, and for limiting access to terminals on his premises to persons authorized to incur charges. The Centre will not verify transmission authorization from user terminals.

3. Or "at regular Centre prices".

APPENDIX V-1

c. Supplies

All work will be processed using Centre supplies, and the Customer will be billed for supplies actually used, unless other arrangements are made with the Service Manager. In cases where arrangements have been made to use Customer supplies, these must meet normal Centre standards. The Centre will not be responsible for processing delays caused by unsuitability or shortages of Customer supplies. Any inventories of Customer supplies held unused at the Centre for more than 60 days may be returned to the Customer.

d. Prices

The standard prices for Centre use are as established from time to time by the EDP Policy Advisory Board. All work not covered by special agreements will be performed at standard prices, and by directing work to the EDP Centre the Customer accepts the prices then in force.

e. Billing and payment

An estimated job cost will be shown on each job printout, or, where there is no job printout, will be printed at the close of each job and sent to the Customer. A final invoice showing all job costs incurred during each month will be provided within 10 days of the close of each month to an officer designated by the Customer. It will be the responsibility of that officer to monitor the account, resolve any disputed charges, and arrange for payment of all agreed charges within 30 days of the invoice date.

f. Property

All specifications, documentation, tapes and programs provided by the Centre to the Customer without specific charge are and remain the sole property of the Centre. All specifications, documentation, tapes, programs and data furnished by the Customer or charged in whole or in part to the Customer are and remain the sole property of the Customer.

MODEL MEMORANDUM OF AGREEMENT

To: Chairman, Policy Advisory Board, EDP Centre

From: Director, EDP Centre
EDP Adviser, DEF Department¹

Subject: Agreement to Process GHI System

The Director of the EDP Centre and the EDP Adviser of the DEF Department have agreed that the GHI System shall be processed at the EDP Centre under the following terms and conditions:

1. SYSTEM DESCRIPTION

The GHI System produces records of goods entered into and withdrawn from bonded warehouses, and tax and other revenues collected. One record is provided for each entry or withdrawal, a master file is updated weekly, and transaction and status summaries are prepared. At the end of each calendar quarter there is a quarterly summary of transactions, and a final summary at the end of each fiscal year.

The following programs are included in the system:

- EEE card-to-tape and edit,
- FFF weekly transaction summary by warehouse,
- GGG consolidation of weekly transactions by region and Canada totals,
- HHH master file update,
- III status summary by warehouse,
- JJJ consolidation of status reports by region and Canada totals.

Programs FFF and GGG are also used in preparing quarterly and annual transaction summaries.

1. Or "Director, GHI Program".

APPENDIX V-2

2. FACILITY REQUIREMENTS

- | | |
|-----|---|
| EEE | 5,000 – 10,000 cards weekly,
30 minutes CPU time for edit,
may be run as cards available, |
| FFF | 30 minutes CPU time plus 20,000 lines output weekly,
1 hour CPU time plus 100,000 lines output quarterly and
annually, |
| GGG | 15 minutes CPU time plus 3,000 lines output weekly,
30 minutes CPU time plus 5,000 lines output quarterly and
annually, |
| HHH | 30 minutes CPU time weekly, |
| III | 30 minutes CPU time plus 100,000 lines output weekly, |
| JJJ | 15 minutes CPU time plus 5,000 lines output weekly. |

3. SCHEDULE

- (a) Cards will be supplied daily as they are prepared by the DEF key punch staff. The last cards and control totals for any week will be available for pick-up by 12 noon on the first working day of the following week. The EDP Centre will provide a receipt for each lot of cards received, and the DEF Department will provide a statement with the last lot of cards showing all lots to be included in the week's processing.
- (b) Weekly outputs for programs FFF, GGG, III, JJJ will be delivered by 9 a.m. on the working day following receipt of the last cards.
- (c) Quarterly and annual outputs for programs FFF and GGG will be delivered by 9 a.m. on the second working day following receipt of the last cards.

4. EDP CENTRE RESPONSIBILITIES

- (a) To pick up input at the DEF key punch room, perform computer processing or have the processing performed at a back-up facility, and deliver outputs on schedule to the GHI Audit Division.
- (b) To check and balance control totals from each program as required by operating instructions.
- (c) To provide weekly invoices at the close of each week's processing for all processing of that week's work, showing separately the charges for each program.
- (d) To make any changes to the programs of the GHI system which are necessary because of changes in the hardware or software of the EDP Centre.

- (e) To take whatever action is required to maintain schedules in the face of difficulties with the pick-up and delivery of work or with the hardware or system software installed at the EDP Centre.

5. DEF DEPARTMENT RESPONSIBILITIES

- (a) To provide, for each step of the GHI system, documented programs and operating instructions according to EDP Centre standards, which have been fully tested on the computer facilities of the EDP Centre, and to accept full responsibility for any costs or schedule delays resulting from errors in these programs or their documentation.
- (b) To update program documentation to take account of any subsequent corrections, and to accept full responsibility for any costs or schedule delays resulting from erroneous or obsolete documentation.
- (c) To provide suitable verified punch card inputs and control totals for processing as required by the schedule, to maintain back-up documentation for all cards, and to accept full responsibility for any costs or schedule delays resulting from delays in preparing punch cards or failure to provide back-up documentation.

6. PRICE AND PAYMENT

- (a) Computing services provided by the EDP Centre shall be priced according to the attached schedule during the first year that this agreement is in force. If renewed or extended, the prices will be those in force as of the date of renewal or extension.
- (b) All prices will be subject to a one-third discount for "overnight turn-around", but in no case will the discounted price for a properly processed week's work or quarterly or annual summary be less than \$500.00.
- (c) In the event that processing must be performed at a back-up facility in whole or in part, the charge for that processing will be the average charge for processing the same programs during the preceding four weeks.
- (d) There will be no charge for any services other than computer processing as provided in the price schedule, no charge for computer processing when results are defective due to EDP operator errors or to hardware or operating software malfunction, and no charge for processing any program whose output is delivered behind schedule unless the delay is due to an Act of God or a cause specified in Part 5 of this memorandum.
- (e) All invoices will be paid within thirty days of receipt.

APPENDIX V-2

7. TERM AND TERMINATION

- (a) This agreement shall be in force for a period of 1 year commencing Unless either party gives notice of termination at least 3 months before the year is up, the agreement will be extended for a second year, and so forth until terminated.
- (b) This agreement may be terminated by either party in the event that the other party persistently defaults on any obligation under this agreement. Termination under this clause will require 30 days notice in writing.
- (c) In the event of termination the EDP Centre will return to the DEF Department all programs, documentation, punch cards and data files pertaining to the GHI system, and the DEF Department will pay the EDP Centre for all work satisfactorily performed under this agreement, and there will be no further obligation on the part of either party.

8. SECURITY

There are no special security requirements applicable to this agreement, but the EDP Centre will exercise reasonable care to ensure that data, programs or documentation pertaining to the GHI system do not come into the possession of any third party.

9. STANDARD ASSURANCES AND CONDITIONS

The standard Assurances of Service and Conditions of Use of the EDP Centre shall apply except as superseded by this memorandum.

Chapter	VI
Date	
	August, 1974

PROCUREMENT OF EDP GOODS AND SERVICES

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- VI-1. ACQUISITION OF LARGE COMPUTER SYSTEMS AND COMPONENTS
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DIRECTIVES

- 4.1 Treasury Board approval in principle shall be obtained before initiating any acquisition of EDP equipment which will:
 - (a) make available from in-house resources an EDP service not previously available in a department or centre, which could be obtained either from other government centres or from the private sector, and whose full initiation cost or annual operating cost is in excess of \$25,000, or
 - (b) result in the exchange or addition of a central processing unit whose new purchase price exceeds \$150,000 (whether or not the CPU is actually purchased).
- This approval may be obtained either through specifying the acquisition and its purpose in the Annual EDP Report and Plan or by special submission.
- 4.2 The Information Systems Division of the Treasury Board Secretariat shall be informed by memorandum or letter whenever a significant acquisition is to be initiated. No commitment to acquire a significant good or service may be made until five full working days after receipt of the memorandum or letter by the Secretariat unless there has been written confirmation that no submission will be required. If after five working days the originating department has not been informed that further Treasury Board approval is or may be required, procurement can proceed without further approval.
- In this directive, a "significant acquisition" includes new acquisitions of goods or services, renewals of service contracts, and any exchange or modification of EDP equipment involving:
 - (a) any central processing unit,
 - (b) any goods or services with an annual cost, rental or imputed rental value which exceeds the greatest of:
 - (i) \$25,000, or
 - (ii) ten per cent of the value of all departmental EDP acquisitions approved in the Annual EDP Report and Plan, or
 - (iii) for total additions to a computer configuration in any fiscal year, twenty per cent of the rental or imputed rental value of the configuration as it existed at the close of the preceding fiscal year.
- 4.3 The Annual EDP Report and Plan shall provide a summary of all acquisitions which were initiated during the reporting year, and state the reasons for those acquisitions not explained in previous reports or procurement memoranda.

GUIDELINES

- 4.4 The Annual EDP Report and Plan should indicate by type and reason for acquisition the EDP goods and services expected to be acquired during the planning period. If this information is not included, departments may be unable to proceed with procurement prior to approval of a specific submission by the Treasury Board.
- 4.5 Departments and agencies should notify the EDP Branch of the Department of Supply and Services as early as possible of their procurement needs, to permit DSS to provide for adequate service. DSS should ensure that any other government agencies which should be consulted during the procurement process are informed at an appropriate time.
- 4.6 Departments and agencies should provide the EDP Branch of the Department of Supply and Services with post-acquisition reports for all significant acquisitions (as defined in directive 4.2), and for any other acquisitions where significant problems with the supplier are encountered.
- 4.7 Departments and agencies should specify in annual EDP reports and plans the target dates when an overall review of their provision of EDP services will take place. For in-house installations, these will be dates when replacement of their computer systems is expected to be made by tender. For departments using private service bureaus these will be planned dates of re-tendering for major service requirements. These dates should be considered in any decision on upgrading or replacement of machine-dependent software or hardware. Prior to these dates, sole source procurement of supplementary or replacement equipment from a current supplier of equipment to an installation will be acceptable to the Treasury Board, unless there are satisfactory compatible alternatives such as would make tendering desirable. Acquisition of equipment from leasing companies should also be considered where appropriate.
- 4.8 Departments and agencies should ensure that small computer systems (including minicomputers) are used only in support of projects where they are cost effective from an overall point of view, and not just from the point of view of the individual user. This may require a flexible set of departmental guidelines permitting the use of small computer systems for general purpose computing in appropriate circumstances, but discouraging it where economies will not be realized when all costs are considered. Departments should indicate in their annual EDP report what steps are taken to ensure that small computer systems are effectively used, emphasizing particular experience which may be helpful to other users.

A. INTRODUCTION

The "Government Contracts Regulations" govern the procurement of goods and services by government departments and agencies. The general policies relating to procurement are contained in "Policy and Guidelines on Contracting in the Government of Canada". These references apply to the procurement of EDP goods and services except as otherwise specified in this chapter.

Special limits to the delegation of approval in principle for the acquisition of EDP equipment are provided in EDP directive 4.1; and in EDP directive 4.2 the Treasury Board reserves the right to a final review of significant acquisitions of EDP goods and services. These measures are considered necessary to assist in the implementation of the EDP policy approved by the Board. On the other hand, the Annual EDP Report and Plan described in Chapter III provides a method of obtaining early approval in principle for any EDP acquisition. Contract approval is in all cases governed by the "Government Contracts Regulations".

EDP goods and services are defined as including the following:

- digital computers, including all peripherals and attachments,
- data conversion equipment,
- unit record equipment,
- auxiliary equipment, including decollating, bursting, binding and reproducing equipment intended to process printer output, and free-standing printers, plotters, tape drives, document readers and computer output to microfilm units,
- production supplies for use with EDP equipment,
- purchased services in which the use of EDP equipment is a principal component,
- computer programming and computer systems analysis services,
- management consulting services relating to EDP,
- EDP software packages,
- EDP telecommunications equipment and services.

Excluded from these guidelines are analogue computers, desk calculators (including programmable desk calculators unless these are equipped with direct access memory in excess of 32,000 bits), accounting machines, military weapons systems, and EDP goods acquired as an integral part of a special purpose system which is not itself designed or easily used for general purpose data processing.

Acquisitions of EDP goods and services from non-government sources will be undertaken by the Department of Supply and Services in accordance with its mandate, except when it considers delegation of purchasing authority to be desirable. The tender process will be used for the acquisition of EDP equipment and services (preceded in the case of major procurements by the necessary consultations to ensure conformity with national objectives) except in cases where the cost of tendering will exceed the likely benefits. The use of surplus capacity on existing government EDP resources is to be considered before new equipment or services are acquired.

B. PARTICIPANTS IN PROCUREMENTS

The division of procurement responsibilities between the user departments and the Supply Administration of the Department of Supply and Services is described in "Policy and Guidelines on Contracting in the Government of Canada" (hereafter referred to as the General Procurement Guidelines). This assignment of responsibilities does not in any way absolve the department with primary responsibility from the necessity of consultation, nor the other department(s) concerned from the right to participate. Responsibilities should not, therefore, be equated with exclusive jurisdiction.

The user department alone bears the ultimate responsibility for the successful implementation of its programs. Therefore, while DSS has primary responsibility for much of the total acquisition process, the user department must be involved in assisting DSS to carry out its functions. Similarly, DSS should be involved as early as possible in the planning and requirements definition phases of any procurement, in order that it can discharge its responsibilities in an effective manner.

The following sections are intended to clarify the typical involvements of user departments, DSS and other agencies in EDP procurements. Full co-operation among all agencies involved in any procurement is assumed throughout.

1. User Activities

User departments and agencies are expected to:

- identify expected procurements in annual EDP reports and plans, and inform other parties as early as possible of any changes in procurement plans,
- ensure that adequate funds are available to cover any procurement,
- secure any required Treasury Board approvals, except contract approval,
- define the procurement requirement, and determine all technical criteria to be used in assessing any tender,
- assist the EDP Branch of the Department of Supply and Services in preparing source lists, both by recommending possible additional sources of supply and by keeping the EDP Branch fully informed of the satisfactory or unsatisfactory performance of present or former suppliers,
- jointly with the EDP Branch, determine the cost effectiveness criteria to be used in assessing any tender, rate responsive proposals, and establish rental, lease or purchase as the best use of public funds,

- advise the EDP Branch of any special contract features which appear necessary in any procurement, either because of technical requirements or because of evaluation findings,
- act as design authority during the life of any contract,
- conduct acceptance tests, and inform the EDP Branch of the contractor's post acceptance performance.

2. DSS Activities

The EDP Branch of the Department of Supply and Services is expected to:

- maintain source lists of qualified suppliers of the various types of EDP goods and services,
- monitor and record the performance of vendors of EDP goods and services, and provide performance information to users contemplating acquisitions,
- provide technical assistance to users as requested in all phases of the acquisition process, and involve other agencies in procurements as necessary,
- represent customer departments and agencies in tendering and contracting for EDP goods and services, and ensure that procurement procedures are consistent with national policies,
- ensure that requests for proposals (including price and availability quotations), invitations to tender, technical specifications, general evaluation and acceptance procedures, contract terms and conditions and contract documents meet user department requirements and are presented to industry according to approved government practices,
- negotiate "standing offer" contracts for supplies and services used by many departments, and warehouse supplies purchased in bulk,
- secure Treasury Board contract approval when required by the "Government Contracts Regulations",
- maintain records of EDP equipment in use in departments and agencies, and assist in arranging interdepartmental transfers of equipment on request.

3. Government Telecommunications Agency Activities

The GTA is expected to:

- provide advice and technical assistance with respect to the planning, acquisition and performance monitoring of telecommunications equipment and services,

- acquire common carrier communications facilities and services as requested on behalf of departments (see Treasury Board Circular MI-2-66),
- maintain records of telecommunication facilities in government.

4. Public Service Commission Activities

The PSC is expected to:

- provide departments with advice and assistance in identifying and acquiring suitable technical training,
- make available to departments a core of training courses in EDP.

5. Information Systems Division Activities

The Information Systems Division of the Treasury Board Secretariat is expected to:

- review departments' and centres' annual EDP reports and plans (including acquisition plans),
- review submissions to the Treasury Board concerning EDP acquisitions, both for approval in principle and for contract approval,
- recommend Treasury Board approval of planned acquisitions, when appropriate,
- conduct an audit of selected EDP acquisitions.

6. Public Archives Activities

The Public Archives is expected to:

- provide advice and technical assistance in the procurement of microfilm services or equipment,
- provide training courses in microfilm applications,
- provide a source of supply for microfilm-related supplies.

C. THE ACQUISITION PROCESS

This section is intended to familiarize departmental personnel with the principal stages in the acquisition process for EDP goods and services. It is intended to be used in conjunction with the General Procurement Guidelines. EDP goods and services should be regarded as "technically complex" as the term is used in that document.

There is a wide range of EDP goods and services and of acquisition situations, and specific procurement procedures will naturally vary across this range. Appendices VI-1 to VI-5 discuss briefly and provide more specific checklists for some of the more important procurement categories.

EDP policy requires that procurements be conducted in a manner consistent with national objectives and industrial goals. The policy also requires that the tender process be used except when required services can be effectively provided through use of surplus government resources, or when the cost of tendering is likely to exceed the benefits derived. The EDP Branch can advise users as to the alternatives likely to be most acceptable in any specific procurement situation.

In acquiring EDP goods it is not uncommon to consult with possible suppliers in advance of the decision for procurement. If this is done, more than one supplier should be consulted, because each supplier will, quite naturally, tend to stress approaches and techniques which favour his goods and services. In all such consultations, government officers must reserve the right to use, rearrange, and consolidate the best suggestions received from various suppliers in any subsequent preparation of tender specifications or formal requests for proposals.

Whenever it is decided to procure EDP goods to which directive 4.1 relates, the prospective user should ensure that the desired procurement is specified for Treasury Board approval in principle in the next annual EDP report and plan. If the procurement is required before the next plan would receive approval, a submission requesting Treasury Board approval in principle should be prepared. It is not necessary to have completed the detailed definition of the requirement before requesting approval in principle. Section (a) of this directive is intended to ensure that alternative sources are sufficiently explored and demonstrably less cost effective before any new type of EDP service (such as time sharing or computer output to microfilm) is instituted in any department or centre, or at least before its annual full cost reaches \$25,000 per annum (this limit also applies to initiation or capital costs). This limit does not apply to the expansion of existing approved services.

Routine production supplies for EDP are usually acquired from DSS, although microfilm-related supplies may be acquired through the Public Archives. Users should provide DSS with forecasts of their supply needs to enable DSS to negotiate favourable purchase agreements, although DSS has undertaken to be responsive to requests of an urgent nature. DSS will similarly be responsive to user requests for particular brands of supplies, however users should periodically examine their reasons for brand preferences, and be prepared to justify them. Much of the following discussion does not relate to routine production supplies.

1. Definition of Requirements

The first step in the acquisition process should usually be the preparation of a complete functional description of the requirement. This is a "what is to be done" description, not a "how it is to be done" description. The use of functional descriptions will frequently result in useful proposals or solutions which would not otherwise have been received.

Where an EDP procurement will implement a totally new function, or one which has been radically modified, a special study may be necessary to define the requirement. Assistance in the conduct of such studies can be obtained from the Bureau of Management Consultants, the EDP Branch in DSS-Supply, the Government Telecommunications Agency, and various other specialist sources, including consultants and manufacturers. It may even be necessary to proceed through several cycles of investigation before the requirements of a departmental program are adequately translated into a good functional description which will serve as a basis for procurement.

The definition of a requirement should include any anticipated changes in level of the requirement over its expected life. All technical specifications should be as generic as possible, without orientation to a specific supplier's equipment or terminology, and should if possible be checked to ensure that none is inadvertently manufacturer-specific. A guideline describing a standardized format for preparing EDP technical specifications is available from DSS.

The definition should include a description of the intended purpose and function of the goods or services to be procured. The appendices contain checklists of potential requirements to assist in drawing up specifications. As these specifications will form a portion of the tender and resultant contract, it is vital that they be complete and provide sufficient details to allow vendors to prepare a responsive proposal.

The effort and resources expended in defining any requirement should be commensurate with its magnitude. Simple procurements should not be burdened with unnecessary documentation. There will also be cases where a department has EDP systems in place and only requires supplementary capacity, capabilities, software or services. These will usually require a much narrower requirement definition, and may, when necessary, be in terms which are largely manufacturer-specific.

2. Procurement Memorandum

For any significant EDP procurement, after a satisfactory definition of the requirement has been prepared the next step should be to inform the Treasury Board Secretariat of the initiation of procurement action as required by directive 4.2. This information memorandum should identify the intended procurement and its currently expected cost, drawing attention to any changes in nature or expected cost since approval in principle was granted through the annual EDP report and plan. For significant acquisitions not approved in previous plans the

memorandum should give details of the type, anticipated cost, intended mode of acquisition and intended purpose of the good or service. It should also include a rough procurement timetable which has been discussed with the DSS EDP Branch.

Note that a procurement memorandum will usually be required for goods and services which have received approval in principle through plan approval. It may be omitted when approval in principle is requested by special submission which is to be followed by procurement action. Obtaining Treasury Board approval is a departmental responsibility; DSS requisitions require the department to certify that approval has been obtained.

3. User Requisition

After defining his requirement, and having received authority from the Treasury Board to proceed (approval in principle), the user department should prepare a requisition to DSS describing his requirement in accordance with the DSS Customer Manual. The following documents should accompany the requisition:

- a copy of the definition of requirements,
- when a contract is to be directed to a sole source, a complete statement providing any detailed justification for such action. Reference should be made to section 5.48 of the General Procurement Guidelines in considering whether a directed tender is justified.

DSS should select, in consultation with the user, a mutually agreeable mode of acquisition. This should be a co-operative process, the user contributing his knowledge of program requirements and technical matters, DSS their knowledge of sources of supply and contracting problems.

The DSS EDP group is prepared to proceed with the acquisition process upon receipt of informal notification of intent to acquire and prior to receipt of the formal requisition. However no contract can be issued until a requisition is received.

Although the user requisition is the first formal contact with DSS, the user should normally have discussed any acquisition with DSS well in advance to anticipate any timing or other difficulties which might apply. Only when the user has himself been surprised by a requirement should DSS be surprised by the requisition. Even then, if the acquisition is significant as described in directive 4.2, the user can give DSS notice at the same time as his procurement memorandum to the Treasury Board Secretariat is prepared.

4. Invitation to Tender

The objective of the tendering process is to select the supplier best able to provide the required functional capability at the optimum cost-benefit consistent with the attainment of program objectives and relevant national policies and objectives. The tendering documents will normally be the basis for the final contract. Early liaison should be established between departmental officers and the assigned DSS project officer to facilitate drafting of the Invitation to Tender.

The Invitation to Tender should follow a standardized format and provide all information needed by suppliers in order to prepare a responsive proposal. In addition to the points covered in the appendices to this chapter, suppliers should be fully informed as to any ground rules for this particular acquisition, non-standard contractual requirements, acceptance criteria and performance tests, and the time and place of bidders' conferences. An indication of the time to be allowed for response to the issued tender is as follows:

- less than \$100,000 — 2 to 3 weeks,
- \$100,000 to \$1 million — 3 to 6 weeks,
- greater than \$1 million — 5 to 12 weeks.

There may be variances from these times depending, for example, on the complexity of the goods and/or services to be acquired. There are also a number of optional variations to the tender process, some of which are outlined below.

a. Price and availability

An investigation of price and availability sometimes precedes the formal tendering process either on an informal basis or through a formal request to industry. Information obtained from a price and availability request can be useful for planning and budgeting purposes. The use of formal requests for price and availability should be limited to firm requirements because of the attendant costs incurred by industry in replying to such requests. In some cases the information obtained through a "P&A" survey may make a formal tender unnecessary.

b. Letter of interest

DSS maintains lists of qualified bidders in each category of EDP goods and services. A letter of interest may be sent to prospective bidders. This letter shall state the general nature of the requirement and any known constraints and/or dates involved. The Invitation to Tender may be restricted to those suppliers indicating interest as a result of this letter.

c. Two-stage tendering

If a two-stage tendering procedure is to be used, it is important that the Invitation to Tender spell out the steps involved. Normally, suppliers will submit their proposals in two parts, a technical proposal and a separate financial proposal. These will be reviewed to select the most promising for further consideration. Selection will be based on both the technical proposals submitted and the prices quoted using the general evaluation procedures outlined in the Invitation to Tender.

The selected potential suppliers will then be given the opportunity to adjust their technical proposals to reflect more closely the department's requirements. Following this "technical repair", the goods and/or services then undergo any tests detailed in the Invitation to Tender. Those suppliers who successfully meet these tests and the contractual requirements, will then be given the opportunity to submit revised financial proposals. The most cost-effective bid will then be selected.

When this procedure is used, both departmental and DSS officers involved in the procurement must exercise great caution to ensure that no bidder is inadvertently given an advantage when modified technical or financial proposals are requested. This danger accentuates the importance of confining contacts with bidder personnel to the channels specified in the Invitation to Tender.

d. Mixed and parallel tenders

When requirements fall in the broad category of general data processing capability, it is sometimes impossible to determine in advance the relative cost effectiveness of the use of service bureaus and the procurement of in-house equipment. In these situations a mixed tender may be considered in which both service bureaus and manufacturers are invited to make proposals to meet the requirements. As the evaluation stage of a mixed tender situation can be extremely difficult, mixed tenders are not to be undertaken lightly. However, when mixed tendering is undertaken, precautions taken when the request for proposals is prepared can greatly reduce the difficulty of evaluation.

Anticipated work loads should not be stated as a single requirement but as a range of workload volumes, and probabilities associated with the various volumes should be specified. The method by which total costs will be estimated over this range of workload volumes should if possible be decided in advance, but not established so rigidly that advantage cannot be taken of knowledge acquired during the evaluation process. Anticipated variations in workload, e.g., monthly or seasonal, should also be specified. Service features such as priority setting, turnaround or dedicating facilities, which could be affected by alternative modes of operation, should either be specified as requirements or the method by which such features are to be evaluated stated in the request for proposal. Special care is required in specifying the manner in which benchmarks will be used in the evaluation. In particular, the method by which benchmark results will be projected into a response to total workload requirements should be developed for the different situations, but not established so rigidly that improvements cannot be introduced.

In cases where the total workload can be specified precisely, service bureau bids may take the form of a fixed price for processing the total workload. Where requirements do not allow the total workload to be specified precisely, the evaluation of service bids will normally have to be on the basis of a bid list of charges and discounts.

An alternative means of tendering in this situation is by issuing parallel Invitations to Tender, one for equipment and one for service bureau service. The issuing of parallel tenders does not remove the requirement of making final cost comparisons between the two modes of meeting requirements and thus of preparing evaluation procedures so this can be achieved. However, the issuing of parallel tenders does facilitate the inclusion of different terms and conditions appropriate to each mode of operation, and also the preparation of special evaluation procedures relevant to each mode. In these situations the issuing of parallel Price and Availability requests should also be considered. These may permit one of the alternatives to be eliminated before formal tendering. In cases of parallel "P&A" or parallel tenders, all potential suppliers should have access to both sets of documents.

5. Meetings and Conferences

A bidders' conference may be called for in an Invitation to Tender. At such conferences additional ground rules may be spelled out and/or clarification made of specifications as requested by bidders. DSS is responsible for arranging such conferences when required, at times and places acceptable to customer departments. For major acquisitions, proceedings of such conferences should be distributed in writing by DSS as soon as possible.

Private meetings with prospective suppliers may also be desirable to discuss special features, examine approaches to problem solving, and answer questions of a proprietary nature. It is the DSS project officer's responsibility to organize all such meetings. It is important that any additional clarification given to any bidder be circulated in writing to the other bidders at the earliest opportunity.

6. Evaluation and Selection

The first stage of the evaluation is the detailed examination of the technical portion of the proposals. An evaluation team composed of user department personnel and the DSS project officer will rate the proposals against the requirements specified using the criteria outlined in the Invitation to Tender. Written evaluation procedures will be developed by DSS and be available to departments on request.

For procurements where benchmarks are to be used, the nature of the systems test should be fully presented in the Invitation to Tender, as should the performance evaluation criteria to be applied. Benchmarks should be designed to test the total system or software in performance of its intended functions to the fullest extent that this is practicable, and should be representative of the workload. Some ingenuity is usually required to balance the requirements of representativeness against the need for a practical-sized benchmark package whose results can be thoroughly studied. The benchmark evaluation team will usually contain user department personnel and a DSS project officer, with other departmental observers as required.

The third stage of the evaluation and selection process is to review the results of the performance tests and rate the suppliers' proposals. In the event that the user department and DSS cannot agree on the selection of a supplier, the matter may be referred to the Treasury Board for resolution as part of a DSS submission for approval to contract. It is expected that the right of appeal to the Treasury Board will rarely, if ever, be used in practice.

7. Payment Methods

In its evaluation, a department should consider acquisition of goods and services by outright purchase, installment purchase, rental or third party lease. The acquisition method selected should be the most cost effective in the circumstances. Subject to the mutual agreement of DSS and the department concerned, it may be possible to effect purchase using the DSS revolving fund when outright purchase is in the best interest of the government and departmental funds are not available. Such use of the revolving fund has not yet been authorized, but if authorized the following conditions are likely to apply:

- departments, in conjunction with DSS, will be expected to determine the period over which the fund will be reimbursed;
- interest charges and administrative expenses will be charged to the department;
- departments will normally be expected to retain equipment at least until the fund has been fully reimbursed;
- if for any reason equipment is disposed of before this time the department will be expected to reimburse the fund to the full extent of any losses incurred;
- the Treasury Board should be informed by memorandum of all intended withdrawals from the fund in excess of \$250,000.

8. Contracts

DSS will prepare, execute and administer contracts in accordance with departmental requirements, the General Procurement Guidelines and all applicable government regulations, policies and procedures. Extreme care should be taken to ensure that the contract covers all known and foreseen details of the requirement since the contract is the legal document describing the agreement between the two parties. It is important that all departmental personnel who deal with the supplier under the contract should be familiar with all relevant terms and conditions.

9. Acceptance

It is the responsibility of the user to ensure that the goods and services delivered against the contract are inspected and meet the requirements of the contract. Inspection and acceptance criteria should be clearly detailed in the contract and, where a formal acceptance test procedure is required, it should be

outlined in the Invitation to Tender and described in the contract. DSS has undertaken to inspect and accept stocked items, and some items such as tapes which are obtained from standing orders.

10. Bidder De-Briefing

The justification for sole source procurement and the rationale behind supplier selection should be made available to industry upon demand. This can best be done by means of a de-briefing for each unsuccessful supplier upon his request to the Secretary of DSS. The de-briefing, to be conducted by the DSS project officer, should normally review the evaluation procedures and state the reasons for award or rejection, and the name of the successful supplier.

11. Post-Acquisition Reports

For each major acquisition the requisitioning agency should submit a report to DSS outlining the performance of the supplier in meeting contractual obligations. For all other acquisitions the requisitioning agency should notify DSS of any significant problem incurred with the supplier.

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ACQUISITION OF LARGE COMPUTER SYSTEMS AND COMPONENTS

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ACQUISITION OF LARGE COMPUTER SYSTEMS AND COMPONENTS

In normal circumstances, large computing systems will be acquired from a single supplier to ensure his full support in the initial installation, run-in and acceptance phases. Only in special circumstances will it be advantageous for user departments to assemble their own systems using components from different suppliers. However, after the initial run-in period (probably six months to a year) consideration should be given to the use of products from other suppliers both for replacement and enhancement, where warranted by price or performance, providing that adequate maintenance is available and contract administration is not too difficult.

In some circumstances, systems which include remote terminals and complex communication networks may be tendered as complete systems. It will usually be preferable, however, to direct the tender for the mainframe and peripherals to one group and the tender for the communications network to a second. Experienced personnel may even consider tendering individual discrete components of their own system design. For systems requiring telecommunications facilities for transmission of data, departments should consult with GTA at an early stage of system planning for assistance in the preparation of performance specifications and later for assistance in the appraisal of tenders.

The following checklist specifies many of the items which must be considered in preparing a call for tenders for a large-scale system. Additional items to cover special situations should be added by the user. Less complex requirements should, of course, be less detailed. The checklist is in the form of a table of contents for a request for tenders, with brief comments on each item.

A. INVITATION TO TENDER

This is the introductory section of the request for tenders, and is intended to familiarize potential bidders with the procedures and practices which will govern this case. It will require some or all of the following parts.

1. Security

A statement of the security classification of procurement documents, proposals, personnel, equipment, services and correspondence, possibly including a checklist of security aspects of the requirement.

2. Summary

A brief description of the purpose of the system, and lists of essential requirements and of additional features. A general configuration outline chart may be included, but detailed charts should be avoided as they may constrain bidder responses.

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3. Documentation of the Tender Call

a. Organization and control of all documentation

A description of the organization of all documentation and of the procedures to be followed during the tender and evaluation phases, e.g., volume titles, numbering systems for procurement documents and proposals, procedures for addenda, inquiries, meetings and correspondence.

b. Addenda and supplements

Formats, number systems and procedures for release of addenda and supplements.

c. Return of the documentation

Conditions of retention and return of government-owned documentation.

d. Inquiries

Addressee for inquiries. Procedures for questions of a proprietary or classified nature. Inquiry closing date. This part should include a statement that answers to all inquiries will be distributed to all tenderers except in cases of a proprietary nature.

4. Documentation of the Tender

a. Proposals/tenders

Normally proposals or tenders will be asked for in three parts:

Part I — System Description,

Part II — Technical Data,

Part III — Financial Data.

Specify the number of alternative proposals that may be submitted and the conditions for submitting each proposal. State the number of copies for each part. Bidders should be instructed that no financial data of any type should be included in Part I or Part II of their proposals.

b. Closing date

A statement of the closing date and time and the delivery address for all proposals. Any procedure for extensions of the closing date or conditions for late receipt of proposals should be described.

c. Acceptance of proposals and tenders

This should include a definition of the total proposal (e.g., includes addenda, questions, answers, manuals, meetings, briefings) and a statement that proposals become the property of the government and will not be returned.

d. Rejection of proposals/tenders

Conditions for rejection, including a statement that the government is not committed in any manner to accept any proposals or tenders.

e. Proposal/tender duration

Period of proposal/tender validity.

5. Contacts with Bidders**a. Meetings of suppliers**

Procedures for meetings with the purchasing and technical authorities, bidders' conferences and bidders' de-briefings after the contract award.

b. Proposal/tender presentations

Procedures for oral presentations of technical aspects of their proposals by vendors following the tender closing.

c. Proposal/tender clarification

Procedures for clarifying proposals via question/answer through the purchasing agency during the tender phase.

6. Requirement Definition**a. Goods and services**

A description of the goods and services that are to be provided, e.g., digital computers, peripherals, support software, communication equipment, communication networks, data terminals, data processing support including engineering, programming, training and operating assistance, back-up and maintenance. Care must be taken to avoid unnecessary constraints on proposals. A good functional description of the requirement, which focusses on the work to be performed, will usually be more appropriate than a description in terms of technical specifications.

b. Expansion plans

State any requirements for expansion potential of the initial system to meet expected growth in workloads, etc.

c. Basis of selection

A general statement of the basis on which the successful tender will be determined, including a statement on how proposals will be declared responsive and non-responsive.

d. Delivery and installation

Locations for delivery and installation of all equipment.

e. Inspection and acceptance

Require the supplier to inform the purchasing agency in writing that equipment and supplies are ready for testing. The system will be subject to initial inspection procedures described in the tender specifications.

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f. Prime contractor responsibilities

Include any special responsibilities and conditions for sub-contractors.

g. Training

A statement that Part III must contain a clear cost breakdown for training.

h. Maintenance

Suppliers' responsibilities. A clear cost breakdown is required. Conditions for equipment replacement.

i. Standard of performance

Definition. Minimum level. Suppliers' responsibilities and commitments if the minimum level is not met. Include definitions of the performance period, effectiveness level and down time. Include procedures for recording performance and conditions for payment.

j. Back-up support

Requirements for hardware and software back-up, and the extent to which this must be on-site or on-call (including the shifts on which back-up is required). A clear cost breakdown should be required.

k. Guarantees of performance

Responsibilities of the supplier in the case of late system delivery. Include procedures for computing any charges for late delivery of all or part of the proposed equipment and software.

l. Termination

Conditions regarding termination of any subsequent contract.

m. Applicable federal government EDP standards

List any applicable federal government EDP standards, and require either that bidders certify that their goods or work will comply with the standards, or that bidders state how their goods or work will deviate from the standards.

7. Miscellaneous

Documentation relating to terms and conditions, such as:

- *Incurred costs*: there should be no costs to the Government for the preparation of proposals, evaluations or meetings.
- *Audit*: verification may be required of any charges for equipment or services. This may require audit by the Audit Services Bureau of DSS.
- *Invoices*: the routing of invoices for monthly rental of equipment and services.

- *User and supplier management functions:* a statement of the responsibilities of the supplier and the user for project management, and of procedures required, under such headings as overall management, contract management, EDP hardware, communications software, data terminals, government supplied materials.

B. SCHEDULE OF EVENTS

This should list the main events in the tender-evaluation-contract-implementation process and, where relevant, provide cross-references to other parts of the document. It is important that this schedule be carefully thought out and checked with other agencies who may have to play a part in its achievement.

C. EVALUATION METHODOLOGY

This should provide a description of each phase of the evaluation procedure. The following items will usually apply.

1. Essential Requirements

A cross-reference to all essential requirements.

2. Additional Features

A cross-reference to all additional features.

3. Test Demonstrations

What test demonstrations (benchmarks) are or are not mandatory, and the conditions under which they must be run.

4. Evaluation Plan

Include a good description of each phase of the proposed evaluation plan, e.g. proposal documentation analysis, simulation analysis, test demonstration analysis, total cost analysis, cost value analysis, etc. Any phase may include elements of two main processes: validation and valuation.

a. Validation

The object of this process is to determine whether a proposal satisfies all essential requirements. Proposals which fail to meet validation tests at any phase will be declared invalid (non-responsive), and be eliminated from further evaluation.

b. Valuation

The object of this process is to determine the cost effectiveness of each valid (responsive) proposal. This includes the assessment of both required features and desirable additional features offered in the proposal, in relation to total system costs. The overall cost effectiveness is the basis for recommendations for final selection and contract award.

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D. PROPOSAL INSTRUCTIONS

1. General

This section explains the purpose of the instructions and provides a general guide for vendors. It should emphasize the importance to vendors of following the format and referencing called for, to ensure that maximum consideration is given to each proposal.

2. Proposal Format

The following format for proposals is offered as an example. The proposal numbering system is shown in brackets () to avoid confusion with the numbering of the Appendix.

(PART 1): SYSTEM DESCRIPTION

(Section 1). General

- (1.1) *Cover Letter.* Letter of transmittal.
- (1.2) *Executive Summary.* A brief statement of salient features of the proposal, including conclusions and generalized recommendations.

(Section 2). Specific Requirements and Features

- (2.1) *Essential Requirements.* A statement of the vendor's position with respect to each item of the essential requirements checklist. If supporting documentation is contained in other parts of the proposal, appropriate references are to be provided.
- (2.2) *Performance beyond the Essential Requirements.* Details of the degree to which additional features are incorporated in the proposed system. Reference to the additional features checklist. If supporting documentation is contained in other parts of the proposal, appropriate references are to be provided.

(Section 3). System Processing

- (3.1) *System Concept and Description.* An explanation of the conceptual approach used to meet the requirements.
- (3.2) *Workload Processing Capabilities.* State the capabilities of the proposed system to process the EDP workload within the required system constraints. References.
- (3.3) *Timing Tables.* Timing tables will be completed in accordance with the instructions furnished. References.
- (3.4) *System Responsiveness.* Specify the degree and manner in which the proposed system complies with the response times specified. References.

(Section 4). Specific Responses

Responses to questions or specific items should refer to explicit requirements or criteria in the tender document, e.g.

- (4.1) Hardware Demonstrability,
- (4.2) Software Demonstrability,
- (4.3) Survivability,
- (4.4) External Back-up Capability,
- (4.5) Environmental Requirements,
- (4.6) Enhancement Capability,
- (4.7) Conversion Support,
- (4.8) Training,
- (4.9) Programmer Support,
- (4.10) Maintenance (hardware and software, preventive and remedial),
- (4.11) Time Metering Devices,
- (4.12) Recording Media,
- (4.13) Data Communication Terminals,
- (4.14) Availability of Equipment,
- (4.15) Communications Network.

(Section 5). Alternate Proposal (if allowed)

- (5.1) *General.* A statement that an alternate proposal has or has not been submitted. When an alternative proposal is submitted, it will be under separate cover in the same form as the primary proposal. The alternate proposal is to be prepared in accordance with the proposal instructions except that this section will contain a summary of the main features of the alternate proposal and indicate any sections of the alternate proposal that are identical to the primary proposal.
- (5.2) *Deviations from Primary Proposal.* The purpose of this section is to outline the significant features of the alternative proposal, and provide a detailed explanation supporting the concepts proposed and showing the advantages of the alternate designs over the designs in the primary proposal. The section is not intended to include detailed technical information, but will provide information of a general systems nature. Sub-sections should present:

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- (5.2.1) A definition of each hardware change, with a statement of the rationale.
- (5.2.2) A definition of each program or other significant systems change, with a statement of the rationale.

(PART II): TECHNICAL DATA

(Section 1). Technical Literature

All appropriate technical literature regarding both the hardware and software characteristics included in the vendor's proposal may be submitted as additional, separately bound, volumes of Part II of the proposal. This section will contain a list of the literature submitted.

(Section 2). System Characteristics

(2.1) *System Configuration Charts* – Sub-sections should present:

- (2.1.1) A functional block diagram showing all components proposed and the interconnections between them. References.
 - (2.1.2) Additional functional block diagrams to illustrate the enhancement capability. References.
 - (2.1.3) Translation, by component, of the capability provided into benefits to the system, and specification of the kind and amount of benefit to be derived, e.g., percentage reduction in time to accomplish the specified workloads.
- (2.2) *Hardware Technical Data Specifications*. Complete the required questionnaire. Provide cross-references to other parts of the proposal.
- (2.3) *Software Technical Data Specifications*. Complete the required questionnaire. Cross-references.
- (2.4) *Communications Interface Specifications*. Complete the questionnaire regarding communications interfacing and any related security requirements. Cross-references.
- (2.5) *Systems Information Specifications*. Complete the questionnaire regarding general systems information. Cross-references.

(PART III). FINANCIAL DATA

- (1.1) *Acceptance of Invitation to Tender*. The Invitation to Tender must be completed, signed by an authorized officer of the vendor's firm and inserted at the beginning of the Financial Section. Photocopies may be used where additional copies are required.

- (1.2) *Cost Information.* Present this information using the DSS "Data Processing Requirement — Purchase/Rental/Maintenance Schedule". This form contains the minimum information which must be submitted. An equivalent vendor's form may be allowed. Since invoices for any subsequent contract (rental or purchase) must usually be itemized in the same format as the bid, vendor's proposals should set forth equipment and services in a manner which will facilitate this procedure. Where the technical section identifies separate items or requirements, the financial section must cross-reference them, and clearly establish their respective costs.
- (1.3) *Supplementary Information.* The vendors will be asked to provide the purchasing agency with information relating to:
- purchase,
 - rental,
 - rental with purchase option,
 - installment purchase,
 - warranties.
- (1.3.1) **Purchase.** Indicate the purchase price at the vendor's plant, with duty and federal sales tax included, for each item or component of the system, and also provide the monthly rates and/or one time charges for all support items; for example, installation and maintenance.
- (1.3.2) **Rental.** Firm monthly rental rates, duty and federal sales tax included, are to be provided for each item. Where the firm monthly rental rates are based on less than 24 hours/day, 7 days/week usage, the following or equivalent information should be provided for each item:
- for the prime or main shift, state the rate and number of hours/month;
 - for the second shift, state the rate and number of hours/month;
 - for the third shift or unlimited use, state the rate and number of hours/month.

All support and/or maintenance rates should be provided.

The vendors should be required to indicate the basis for prorating monthly rental rates where equipment is installed for less than a full calendar month.

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The rental rates and monthly or hourly charges should be *firm* for at least 12 months following acceptance of equipment. Monthly rental rates for equipment may also be provided for subsequent years, including rental rates for any proposed equipment enhancement. Cancellation charges should be given.

- (1.3.3) Rental/purchase option. Information relating to a purchase option should be provided with the following minimum requirements: the time period of applicability, the basis of determining purchase prices, the amount of accrued rental deductible from purchase prices and the terms of payment.
- (1.3.4) Warranties. Describe fully. All charges associated with the replacement of defective equipment under lease or warranty will be borne by the vendor.
- (1.4) *Transportation Charges.* State transportation charges from the vendor's plant to destination(s), including all on/off loading, local cartage, rigging, etc. Responsibility for all equipment rests with the vendor until acceptance tests are completed. Transportation charges may be made a responsibility of the vendor, to be included in his price.
- (1.5) *Royalties.* If payable, royalties are to be specified by both the rate and amount for each item concerned. It is also necessary to state:
 - to whom they are payable;
 - whether or not the monthly rental rates or purchase prices include those royalties; and
 - that no royalties, other than the above will be charged.
- (1.6) *Canadian Content.* The vendor may be requested to state the percentage of Canadian content (value added) included in the goods and services to be provided, the use of existing or new Canadian facilities to satisfy the requirement and the vendor's future intentions for continued use of such Canadian facilities. This information is especially important in the case of major procurements which may relate to national objectives.
- (1.7) *Training.* The cost of personnel training and related publications and material are to be specified. These may be made a responsibility of the vendor, to be included in his price.

E. GLOSSARY OF TERMS AND ABBREVIATIONS

Standard terminology using definitions contained in the ANSI "Vocabulary for Information Processing" and the Treasury Board "Glossary of Material Management Terminology" should be used wherever possible. All terminology not defined in standard references should be defined in a separate section of the Invitation to Tender and of the vendors' proposals.

ACQUISITION OF COMPUTER SERVICE BUREAU SERVICES

A computer service bureau is an organization which provides access to computers and/or related equipment and services. Certain service bureaus specialize in particular modes of computer data processing, for example:

- batch processing (usually multiprogramming),
- interactive processing or time sharing,
- text processing,
- information storage and retrieval.

Use of the facilities of departments or agencies of the Government of Canada is covered by Chapter V, "Choice of EDP Services." The same principles nevertheless apply in assessing the capabilities and performance of government centres and of private centres.

In all procurements which include acquisition of EDP hardware the checklist in Appendix VI-1 should be consulted. That appendix also provides the basic structure of an Invitation to Tender which will not be repeated here.

In most procurement situations, in particular for large acquisitions, requirements should be viewed in terms of the total departmental or centre EDP requirement. In defining requirements it should be recognized that certain specialized modes of operation (e.g., time sharing, text processing) do not always mix efficiently on individual installations. Thus when procuring EDP goods and services it may be advisable to define such specialized requirements separately in order to retain the option to service them with separate hardware, or from a centre or service bureau specializing in that mode of operation. Even a department with its own departmental centre will often find it cost effective to use a service bureau to meet specialized requirements.

User departments may acquire services either by a requisition to DSS or by a service order directly to any service bureau covered by a DSS standing offer. Departments with large requirements should consider whether tendering would be more beneficial than utilization of a standing offer. If so, tenders should be called at regular intervals (not necessarily annually) and planned dates of retendering specified in EDP addenda. To facilitate the planning of standing offer arrangements, DSS will be asking departments for estimates of anticipated annual standing offer usage.

Tendering for service bureau services will follow in general the procedure outlined in Chapter VI but with a specialized emphasis. The following checklist indicates points at which service bureau tenders may differ from the assumptions of Chapter VI, or from Appendix VI-1. It is intended to help prepare and manage such tenders and may also assist in making an evaluation of service bureaus whose use under standing offer conditions is being considered. The numbering corresponds to that used in Appendix VI-1.

APPENDIX VI-2

A.1 Security

This can be one of the most important aspects in the procurement of service bureau services. Security requirements should be stated as generally as possible to allow vendors to describe in their proposals their normal security procedures and any special arrangements they propose to make for this tender. Arrangements should be made through DSS for a security evaluation of prospective bidders if this has not already been done. Where security is a requirement then the evaluation procedures should include an assessment of this part of the vendors' proposals.

A.2 Summary

A brief description of the purpose of the requirement for data processing services, the current arrangements for data processing if any, whether communication lines and terminals will be required, and a list of all other essential requirements and additional features.

A.6.a. Goods and services

The total data processing requirement to be serviced by this tender should be described here. Absolute accuracy in description is often impossible, and it may be best to indicate a range of possible processing loads and timings, together with an indication of how bid prices within the range will be weighted.

Where requirements are for different types of service, i.e., services normally provided under different operating environments, then requirements for each type should be stated separately, allowing vendors to bid on one, some or all types. Where it is essential or beneficial to have some of the types of service provided from a single location this should be stated.

When the processing requirements include a list of production applications, information should be provided for each application (or at least for the largest applications) to identify the type of service and system software required, any software support packages required, and the volume and timing of the work to be performed. Where the applications comprise existing programs, the language they are written in and the resources they use should be given. Where the applications are systems under development, estimates should be given of their resource requirements and implementation dates.

A large percentage of processing requirements will likely fall into the program development category. For this the languages to be used should be given, the acceptable modes of operation, and (where applicable) acceptable turnaround times, preferably by priority and size of program.

A.6.b. Expansion plans

Each vendor should be asked to provide a description of his current facilities, a general description of his current workload, and recent operational statistics indicating the level of service he is providing. In addition the vendor should indicate his anticipated future workload, including work under the current tender, and his plans to meet increases in volume and also meet his future turnaround commitments.

A.6.d. Location

State any restrictions on the locations at which the required processing may be carried out. For acceptable locations the vendors should be invited to propose ways of providing communications from their sites to the user's premises. Alternative solutions, with associated costs and characteristics, will help the user to select, during evaluation, the most cost effective alternative or mix. When the user's staff will have to work at the vendor's site, then accommodation must be a requirement.

A.6.g. Training and technical support

The tender document should indicate the type and extent of technical counselling, training and other support required. This requirement should invite the vendor to describe the support and training he currently provides, together with the manner in which he proposes to meet any additional requirements of the tender. The cost of training and all other support should be quoted separately in the financial section of the vendor's proposal.

A.6.i. Standard of performance

The vendor should be asked to provide details of any recent and proposed changes in his configuration, both hardware and software, and the impact of these changes on users. The names of some users may be required as references. Recent statistics indicating the frequency and severity of hardware and software failures should also be requested.

The standard of performance required will normally have been specified in the Goods and Services section (A.6.a.). This section (A.6.i.) should state the vendor's responsibilities under any resulting contract in the event the specified level of service is not met. If the level of service is to be validated, the period in which this may be done should be clearly defined as well as the procedures by which the level of service is to be tested. Responsibility for the cost of validation tests should also be covered.

A.6.j. Back-up support

Information should be requested concerning the arrangements the vendor has established for back-up services in the event of catastrophic failures at his site. He should also be asked to indicate what arrangements he has for overload conditions and how and when these arrangements would assist users. Details of back-up for any communications facilities proposed should be requested. A clear breakdown of the cost implications of the back-up arrangements should be required.

A.6.k. Guarantees of performance**(i) Production schedules**

The repercussions of not meeting particular production schedules should be outlined, and penalties or vendor responsibilities defined.

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(ii) Turnaround

If a specified minimum turnaround is required, the procedures for ascertaining the actual turnaround should be defined together with any penalties or vendor responsibilities in the event requirements are not met.

(iii) Response times

If specified response times are required, the procedures for monitoring response times should be given together with any penalties or vendor responsibilities in the event minimum requirements are not met.

(iv) Support services

Specify the vendor penalties or responsibilities which apply in the event that support requirements are not met.

(v) Emergency needs

Specify the level of performance required in response to possible emergency needs (e.g. failure of a key production system), and estimate the likelihood of such needs arising.

C.3 Test Demonstrations

The most suitable basis for evaluating the processing capability and price of a service bureau's proposal is usually by means of benchmarks. As in the case of evaluations of hardware, benchmarks should be carefully selected to be representative, as far as is practical, of the total workload requirements. In addition, for the purpose of rate schedule bid evaluations, the following points should be considered:

- a. Separate benchmarks should be prepared for each type of processing required, and evaluated separately.
- b. Benchmarks should be run under the normal bureau operating conditions relevant to the requirement each benchmark represents.
- c. Benchmarks should be run as far as is practical in the same internal design sequence as developed.
- d. Where an assessment is to be made of a bureau's ability to improve application programs through design and code changes (to suit its configuration) this should be done separately from, and as a supplement to, normal benchmarking.
- e. Benchmarks of workloads having specific turnaround requirements should be run under different priorities enabling any trade-off between turnaround and cost to be assessed.

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- f. Variations in pricing should be ascertained by running certain benchmarks under differing load conditions.
- g. The benchmarks should be costed by the bureau's normal accounting methods and the regular accounts produced.
- h. Any special cost discounting proposed should be evaluated separately after normal costs have been obtained.

Where a service bureau tender produces fixed price bids rather than rate schedule bids, the evaluation task is simplified. Even under these conditions it is unsafe to omit testing likely performance by benchmarks, and points a - e above still apply. Point d becomes of special importance in these situations, and contracts should guard against economy-motivated "improvements" which may weaken systems.

C.4.a. Validation

The validation process should ascertain whether the proposal meets all the essential requirements. For example, security requirements could be validated by observing the operational methods used by the bureau and examining its manual of procedures and methods of protecting the confidentiality of clients' data. The stability claims of the service bureau could be validated by checking the information provided against other users' records.

C.5 Monitoring

The evaluation of a service bureau must be an ongoing operation and both the invitation to tender and the contract should provide a basis for the regular monitoring of these services. Comparisons should be made both to cost and performance during the original evaluation and to the vendor's claims in his proposal. In particular, levels of service specified in the contract should be monitored. Where cost of processing is dependent on the priorities given to individual runs, the distribution of use of priorities should also be monitored and compared with the priority job requirements forecast when the request for proposals was prepared.

ACQUISITION OF PROPRIETARY SOFTWARE PACKAGES

A. INTRODUCTION

Acquisition of a proprietary software package will sometimes be a reasonable alternative to designing and writing a program to suit a specific requirement. It will frequently be a better choice than writing variants of similar programs many times over.

Proprietary software may be defined as computer programs (or sets of programs) which are designed to accomplish certain objectives of interest to others besides the program owners, and which are offered for sale or rent by the owners. These programs are normally made available as a "package" which includes a program deck or tape, program documentation and instructions for use.

Software packages are of two principal types:

1. Applications Software:

These are generalized programs which operate on user data under user-specified parameters to produce a user-defined report. They are usually designed to accomplish a defined operation or set of operations. Such packages are available for many purposes, e.g., inventory control, machine and business accounting, critical path planning and statistical analysis.

2. Systems Software:

These are programs which are hardware and/or configuration dependent, and which perform repetitive, logical utility functions. They are usually intended to make computer use more efficient or programmers more productive. Examples of such packages are compilers, assemblers, debugging aids, sort programs, etc.

The operating or executive systems supplied by computer manufacturers along with their computers have not usually been regarded as software packages. They should be considered as an integral part of the computer system at the time of acquisition, and rated as part of the selection exercise. However after the initial run-in of a system, alternative sources of supply for some operating system components, or even for complete operating systems, may deserve consideration.

B. MAKE OR BUY

A number of advantages and disadvantages may be associated with the use of software packages compared with the use of in-house developed programs. The likely advantages include:

- savings in system development time,

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- known program costs (and usually lower costs) than associated with in-house development,
- comprehensive documentation (often a useful example for in-house staff, but sometimes not as good as claimed),
- ease of implementation.

Disadvantages likely include:

- lesser operating efficiency than "tailored" programs because of general purpose features built into the program, but not needed in particular applications,
- reduced flexibility, which may place constraints on both system design and the variety or format of inputs or outputs,
- greater difficulty in introducing program changes (although the likelihood of needing such changes is probably reduced).

Decisions regarding the use of software packages should be based on consideration of all relevant advantages and disadvantages. If possible the advantages and disadvantages should be costed over a realistic time span as an aid to analysis: this will help focus attention on the duration of need for the package and the frequency with which it will be used. It will also facilitate comparison with the "payoff" from alternative uses of the time of in-house staff. There are usually alternative uses for staff, and these are often a principal reason for package use, provided that the package is available on a lease or rental basis for a reasonable term.

C. PACKAGE SELECTION

The selection of a suitable software package from the many on the market is not a simple task. It requires a good knowledge of the principal intended use(s) of the package and the environment into which it is to be introduced. It requires a careful comparison of the characteristics of leading contenders, which may well require demonstrations or even benchmarking. And it requires comparison of the conditions under which the various contenders can be acquired (a second-best package acquired on very suitable terms may be the best buy or even the only economic alternative to in-house development).

1. Environment and Use

The principal factors to be considered here are the available equipment configuration and operating system and the period over which they are likely to remain in use. Modifications to adapt equipment or operating system to software packages are possible, but the cost of such modifications must usually be charged against the package in make or buy comparisons. The variety of application problems which might lend themselves to a package solution is another environmental consideration which is often relevant; a thorough knowledge of the characteristics of the inputs and required outputs of these applications is

essential to the selection process. User and programmer sophistication is another relevant consideration; almost invariably some accommodation of users or programmers to the limitations of any package is an essential of successful implementation, and this accommodation may not be easily achieved.

2. Available Alternatives

Descriptions of available software products may be found in the standard EDP directories, and much valuable information can also be obtained from trade magazines, package users and consultants. The EDP Branch of DSS will be developing information on software packages in use in the government service, and may be of considerable assistance in identifying alternatives. It should be possible to eliminate at this stage those packages which are not compatible with the equipment or operating system in use, although the possibility of modifying a package to fit existing equipment should not be forgotten (this would reduce the time and cost benefits of package acquisition).

3. Selection Criteria

The comparison of packages should take into account the likely performance of the package in the user's environment, the documentation and other characteristics of the package, and its cost (including terms of acquisition and implementation costs).

a. Performance characteristics

- are the capabilities of the package consistent with installation or application needs;
- what are the minimum hardware and software requirements of the package;
- what constraints will it place on record or file construction, forms design, computation possibilities, output design, etc.;
- does it meet requirements for file protection and data security;
- is it easy to use;
- is it machine-extravagant or relatively economical in machine use;
- how good is the systems design and programming;
- does it have diagnostic aids;
- what data is available on compile and execute timings and on throughput timings.

b. Package characteristics

- how good is the documentation; does it meet or surpass the standards you would like your programmers to apply;

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- will the documentation permit modifying the program to better meet your needs, or will the vendor modify it for you (in either case, at what cost);
- how good is the instruction material and training offered; does it meet the needs of your users, your programmers and your machine operators;
- how many customers does it have; are their needs similar to yours and are they satisfied;
- how solid is the supplier; is he likely to remain in business over the period you expect to be using his product; if not, what protection is offered to users.

c. Cost characteristics

- is the package available on a rental, lease or purchase basis; if rental or lease, what is the proposed contract duration, and is there a termination clause;
- what is included in the basic price; are there extra charges for installation and training, for manuals, for modifications, for debugging assistance, for updating to take account of hardware or operating system modifications, etc.;
- what are the implementation costs (record or file conversions to meet package constraints, changes to programming or operating standards, changes to forms in use or user procedures, time-cost of staff attending training classes, etc.);
- what upkeep will the package require from user staff (e.g. to adapt to system software modifications, or to include package updates);
- how long will it take to install and check out the package; how long will the vendor provide on-site technical assistance and debugging without extra charge.

When acquiring a package that has been on the market for some years, and has many satisfied users, benchmarking will probably add little to an appraisal other than to illustrate the adaptation problems faced. When considering acquisition of a new product with few users (or few users with similar characteristics) a thorough benchmark test should be regarded as essential.

Use of a formal tender process is unlikely to be of assistance in software package selection, and is not recommended at this time. Where no existing software package fully meets initial requirements, careful consideration should be given to the costs of tolerating its inefficiencies versus the costs of modifying the package or developing an in-house solution. Frequently the "good enough" package solution is much more cost effective and provides much earlier program benefits than the "fully suitable" modified or tailored program, but it may be difficult to convince users (and even programmers) that this is the case.

D. CONTRACTING

Contracting for packages will normally be by DSS, but users should consider carefully the clauses that are necessary for their protection. These will vary with the circumstances, but may include:

- payment to be contingent on installation and successful operation of the package on your machine (acceptance tests should be defined),
- time period for return of package if found unacceptable (especially suitable for low-cost packages which are user-implemented),
- the specification of any agreed-upon implementation support,
- liability of the supplier to correct errors discovered after initial implementation and acceptance,
- liability of the supplier to keep the package operational in spite of changes in the equipment manufacturer's software, and any charges involved,
- the right to use the package on more than one installation, and any related charges.

The extent of the assurances included in the contract should be in proportion to the cost of the software package and its importance to the user.

Contracts negotiated with software suppliers should, whenever possible, be on behalf of the government rather than individual departments and should, where possible, ensure that full documentation, including source code, will be made available in the event that the vendor goes out of business. This may require the deposit of source material with a trustee.

The contract should also provide a basis for a post-implementation audit of the software package. DSS should be provided with a post-installation report on every software package to assist other departments who may have related needs or problems.

ACQUISITION OF EDP CONSULTING SERVICES

The contracting out of certain EDP tasks is generally encouraged where it is cost effective to do so, based on a comparison of full costs. This approach is particularly suitable where the requirements are seasonal or short term and has also proven effective for some continuing workloads. The use of a consultant also forces a more detailed specification of a project than would often be provided to in-house staff. Therefore, in large systems of major importance, the use of a consultant may create conditions favourable to completing the project on time (cf. Chapter IV, Part D).

Contracting for support in the areas of programming, analysis and operations can be particularly effective where the flexibility of being able to obtain services by the hour, week or month can be used to advantage, or where it is desirable to predetermine costs for a well-defined task. Disadvantages can arise through the reduced continuity that contracting provides and this should be considered during the evaluation of alternatives.

General advice on the use of management consultants is contained in MI-9-66 "Policy on the Use of Management Consultants from Outside the Government" and in Information Bulletin 1966-2. Where relevant, reference should also be made to TB Circular 1971-64, "Fee Guidelines for Personal Service Contracts with Individuals". This appendix does not reproduce the material available in these documents, but merely provides a few reminders in a place convenient for EDP managers.

1. Tendering and Standing Offers

The tender process remains the most satisfactory assurance of obtaining desired EDP consultant services at a satisfactory price. In general, the number of consultants invited to bid in any instance should bear a reasonable relation to the likely value of the contract. As the likely contract value declines, it may be desirable to substitute less formal discussions followed by proposals from three or four potential suppliers.

DSS has negotiated standing offer contracts with suppliers of programmers, analysts and operators. It will usually be advantageous to take advantage of these arrangements for small jobs, rather than incurring the expense of tendering.

2. Information for Suppliers

Potential suppliers should be provided with information which will enable them to evaluate the problem and estimate the costs of providing the required service. This information will normally include:

- problem specification;
- the definition of the respective responsibilities of contractor and employer;

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- the dates at which the project may be commenced and by which it must be completed;
- the location at which the work will be performed;
- a statement of the programming languages to be used and a copy of the programming and documentation standards which the successful bidder will be required to follow;
- the computer(s) for which a system is to be designed or programmed;
- the computer(s) which will be available for testing of programs and analysis of data, the times of day at which they will be available and the turnaround which the consultant is entitled to expect;
- definition of the responsibilities for providing program and system test data;
- security requirements.

All potential suppliers should be informed of the factors to be used in tender evaluation. Examples of the type of factor which may be considered are the experience of the consultant, the experience of the staff proposed, the extent of commitment of resources, and price.

3. Information from Suppliers

Potential suppliers should be asked to provide sufficient information to enable the department to evaluate tenders and to manage the project. For example:

- the date at which the consultant will be available to commence work;
- the names, resumés (including security clearance, if required) and daily rates (including expenses) of all the personnel to be employed in the project;
- the total price bid giving separate bids for computer time and all other costs;
- itemized estimates showing for each phase of the project:
 - the man-days to be used for each separate level of employee, and each per diem rate,
 - the calendar days to be used;
- a statement of the amount of participation required from the user's staff;

- names of other organizations for which the consultant has worked in the past;
- an undertaking regarding the minimum time commitments of the personnel retained for the project;
- the technical approach to be taken.

Users should interview the key staff proposed by bidders before making a final selection. Interviews are equally desirable before accepting staff supplied under a standing offer contract.

4. Fixed Price or Per Diem

Consultant contracts may be on a fixed price basis, a per diem rate to a fixed ceiling, or a straight per diem basis. They may include expenses or may be price plus expenses. They may or may not include secretarial or other support from the user's staff.

Whenever a job can be well-defined and estimated in advance it will usually be desirable to ask for bids on a fixed price basis, or at least to draw bidders' attention to the desirability of submitting a bid on this basis. This will usually apply to programming tasks where complete firm specifications are available, and may apply to particular computer systems analysis or management consulting assignments. Well-defined jobs can usually be safely let to the lowest bidder.

When a job cannot be well-defined, it may be undesirable to place too great emphasis on the cost certainty associated with the fixed price bid. In such cases the quality of the bid personnel and the consultant's proposal and reputation are probably better guides to value than price certainty or even the lowest possible price. And the concern of the government officer should always be for best *value* in relation to the need, not merely for lowest price.

5. Management of the Consulting Contract

Use of consultants does not reduce departmental responsibility for the continuing management of the project. Regular monitoring is necessary to ensure that satisfactory progress is being made and that the terms of the contract are being observed. When the contract involves a task that cannot be well-defined it is often desirable to have in-house staff working closely with consultant personnel to ensure a full understanding of the resultant recommendations or system, and a constant awareness of consultant effort. On a well-specified task monitoring can be more periodic, and consist primarily of comparisons of outputs with specifications.

ACQUISITION OF TELECOMMUNICATIONS EQUIPMENT AND SERVICES

This appendix refers to the procurement of telecommunications facilities in support of EDP. When these services are acquired in conjunction with an EDP system acquisition, this appendix will supplement Appendix VI-1.

This appendix pertains primarily to procurement of services and equipment from the regulated common carriers and in most cases will be for facilities to transfer data among EDP equipment located at different sites. Prospective users of telecommunications equipment and services should refer to MI-2-66, "Procurement and Use of Administrative Telecommunication Equipment and Services".

Departments planning to acquire telecommunication facilities should consult the Government Telecommunications Agency at an early stage. Such consultation will make available to user departments the services listed below and in addition permit co-ordination of the procurement of government telecommunication facilities and of common carrier services.

Common carriers do not, at present, allow their services to be acquired by suppliers of other EDP services for resale to users. In most instances these facilities will be "tariff items", i.e., items for which rates are regulated by the Canadian Transportation Commission or a provincial regulatory agency. The tariff structure is such, however, that relatively minor technical changes can significantly alter charges to the user.

The Government Telecommunications Agency can assist user departments in the procurement of telecommunication facilities in the following areas:

- identifying requirements which could be serviced by existing government facilities;
- providing estimated costs for alternative means of meeting user functional requirements;
- converting user functional requirements into equipment specifications;
- specifying interface requirements;
- reviewing cost effectiveness of proposed facilities;
- acquiring telecommunications services;
- evaluating acquired facilities and assuring satisfactory service;

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- recommending possible consolidation of telecommunication facilities among applications.

When dedicated government telecommunications facilities are being used, care should be taken to ensure that the cost of these facilities is kept visible and that use is restricted to those departmental programs for which they were approved.

In the event that experimental telecommunication facilities are to be used for evaluation purposes, precautions should be taken to retain the right to request proposals for similar facilities in open competition should the experiment prove successful.

Chapter	VII
Date	
	August, 1974

GUIDE ON EDP ADMINISTRATION

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DIRECTIVES

- 5.1 All departments and agencies shall ensure that their full EDP costs are accumulated, that their EDP services are priced, that user programs and projects are regularly notified of their priced use of EDP resources, and that adequate accounts are maintained of EDP costs and actual or pseudo revenues.
- 5.2 The Information Systems Division of the Treasury Board Secretariat shall assist departments to estimate the common-service government overhead costs applicable to their EDP resources on an appropriate basis (percentage mark-up, simulated fee for service, or other), and will also assist departments on request to estimate departmental common-service costs applicable to EDP, and to establish appropriate depreciation periods for owned equipment.
- 5.3 A schedule of prices, at which all authorized customers can obtain service under the same stated conditions, shall be submitted for approval in annual EDP reports and plans by each EDP centre and common-service EDP staff designated by the Treasury Board Secretariat.
- 5.4 Deputy heads are authorized, with the approval of the relevant policy advisory board or committee (if any), to modify approved EDP price schedules to meet changing conditions, provided that:
 - (a) users of the services in question and the Information Systems Division of the Treasury Board Secretariat are provided with a copy of the new price schedule at least 30 days before the new prices first become effective, *and*
 - (b) the net result of all changes to approved price schedules will not change planned annual revenue by more than the smaller of 10% or \$250,000, nor planned annual net operating results by more than \$100,000, taking into account the likely effect of price changes on business volume. Changes exceeding these limits should be carefully reviewed in advance with the Information Systems Division of the Secretariat to determine whether the proposal will require a special submission to the Treasury Board.
- 5.5 Each department and agency shall establish and maintain appropriate levels of internal reporting of full EDP costs and actual or pseudo EDP revenues, and shall report summary information to the Treasury Board Secretariat in the detail and form specified and periodically revised by the Secretariat in consultation with the EDP Advisory Committee.

GUIDELINES

- 5.6 The full cost of in-house or external EDP services should include all direct and indirect costs incurred in order to obtain the EDP outputs required by government programs served by EDP, regardless of whether these costs are met from the budget of the EDP group providing the service, the budget of the user, or another source. The full cost of EDP services should not include identifiable direct or indirect costs incurred in order to help attain the objectives of identifiable government programs or policies other than those requiring the EDP outputs.
- 5.7 All departments and agencies which have staff or equipment employed primarily in the provision of EDP consulting, analysis, programming, data conversion, machine or other services should maintain records of the full cost of such staff and equipment sufficient to meet current requirements for reporting to the Treasury Board.
- 5.8 All departments and agencies which obtain EDP consulting, analysis, programming, data conversion, machine or other services from other departments or from the private sector should maintain records of the full cost of using these external EDP services. These records should take into account all in-house EDP costs incurred in order to use external services. These in-house elements should be calculated on a full cost basis.
- 5.9 Price structures for any EDP unit should provide separate charges for the principal EDP services of the unit, in order to ensure that the market value or cost of each service is visible to its users.
- 5.10 Schedule prices for any EDP unit should normally be competitive with those offered by other suppliers, taking into account such important factors as:
 - the availability of competitive services,
 - the reliability and quality of service offered,
 - customer acceptance of services and prices,
 - special features of services offered,
 - the full cost of providing particular services,
 - the amount of use made of particular services,
 - the desirability of attracting or discouraging particular types of work.
- 5.11 In appropriate circumstances, EDP services may be offered for particular jobs on the basis of fixed price, incremental cost, cost plus, or other special arrangements. Each such arrangement should be covered by a specific memorandum of agreement as recommended in guideline 3.8. Annual EDP reports should distinguish that part of actual or book revenues for EDP services derived from each such arrangement.

- 5.12 Where competitive prices would not generate actual or pseudo revenues sufficient to cover the full costs of providing an EDP service, this should be clearly indicated in annual EDP reports and plans. The reasons for such planned deficits, and plans to re-establish a balance between costs and revenues, should be fully described.
- 5.13 Sections 5.1(c) and 13 of the "Financial Administration Act" govern the setting of charges to the public, and this topic is further explained in the "Guide on Financial Administration for Departments and Agencies of the Government of Canada", Part II, Chapter X. When it is apparent that the public will be charged for the use of government EDP facilities, the situation should be discussed with the Treasury Board Secretariat as a Treasury Board submission may be required to provide an appropriate delegation of pricing authority.
- 5.14 Departments and agencies should maintain accounting and reporting systems to collect and display the full costs of EDP operations and use, and any actual or pseudo revenues related to the use of in-house EDP resources, in accordance with the accounting model presented in Appendix VII-3 of the Detailed Volume of this Guide. When possible, these systems should use the same direct entry of source data as normal departmental financial reporting. These systems should be linked to departmental cash accounts through double entry control and contra accounts, and should be reconciled regularly with departmental cash accounts to ensure accuracy and completeness of coverage. Where special circumstances, such as the small scale of EDP operations or use, indicate exceptions to this guideline, alternative proposals should be reviewed with the Information Systems Division of the Secretariat before implementation.
- 5.15 Users should be notified at least once a month of the cost of each type of EDP service provided to each program and project unless alternative procedures are provided for in a memorandum of agreement.
- 5.16 In implementing job accounting algorithms for charging for computer services, computer managers should try to find a reasonable balance between the cost of measuring facilities usage and the usefulness of the results obtained. Precise measurements and a high degree of repeatability of charges may be obtainable only at an unprofitable cost in software effort and in use of computer resources by the job accounting system.
- 5.17 Departments and agencies should discuss the choice of a funding method for their EDP units with the Financial Management Division and the Information Systems Division of the Secretariat to ensure that the method chosen will accomplish all appropriate objectives. In general, the use of appropriation funding should be limited to EDP units serving single departments or programs, and the use of vote netting to cases where only some EDP costs need be recovered from other departments or programs. Revolving funds may be suitable for any sizable EDP unit, and will usually be the best choice where service must be provided to a number of departments or programs.

5.18 Users of EDP services should budget for the cost of required services on either a real or "shadow" basis, and the use of services should be charged against their budgets. Departmental management should review variances between planned and actual costs of EDP use to ensure that this resource remains under management control.

A. INTRODUCTION

The purpose of this chapter is to ensure that all levels of management — EDP line management, user management and departmental and central agency management — are provided with sufficient financial information of sufficiently uniform quality to ensure the efficient utilization of this resource and to conform with the policy requirement that in-government EDP services be used only where these are more program effective or cost effective than use of private sector EDP services.

The first requirement is that EDP costs be defined and made visible to all concerned levels of management. The definition must be such as to ensure that fair comparisons are possible between in-house and external EDP costs. This objective must be tempered by the need to ensure that the cost definition and costing process do not themselves impose unrealistic costs on users of EDP.

The second requirement is for a mechanism for distributing EDP costs to the user programs and projects for which funds are appropriated by Parliament. EDP policy defines EDP as a resource to *support* departmental programs; EDP costs must therefore be identified with the supported programs to permit a proper evaluation of the costs of those programs.

These two requirements create the need for cost-based or accrual accounting information relating to EDP costs and their allocation. This accounting must be regarded as a management tool, and developed in each department or centre to provide information adequate for all levels of management at minimum cost. To develop suitable systems, EDP managers will require some understanding of the "Guide on Financial Administration for Departments and Agencies of the Government of Canada" published by the Treasury Board Secretariat, and should have access to expert financial assistance thoroughly familiar with that Guide.

B. THE COSTING OF EDP SERVICES

The need for adequate costing of EDP derives from the need of the federal government to distribute scarce resources among competing programs and projects, both at the overall level and at the departmental level. Cost data are also required to permit program and project managers to choose the most cost effective of the alternative techniques by which particular program or project objectives may be attained. Within the EDP community, a knowledge of and sensitivity to all relevant costs is a necessary basis for developing and implementing truly cost effective EDP systems and operations.

It often appears to the line manager that conventional government budgeting and planning techniques are intended to encourage him to concentrate on selected aspects of cost, and to ignore other cost elements. And whether intended or not, the exclusion of important cost elements from his budget certainly creates such a tendency. It also distorts comparisons between the cost of providing a service in-house and that of obtaining the service from private sources; in the former case budgets reflect only partial cost, in the latter they more closely approach full cost.

The objectives of EDP policy require the development of a costing system which differs from the cash accounting system now used for government budgeting and expenditure control. The following sections provide a definition of the full cost of EDP, discuss the principal differences between "full cost" and cash or budgetary cost, and indicate the applicability of the full cost concept. Throughout this discussion it is essential to bear in mind that the costing of EDP is required primarily to improve the costing and the cost effectiveness of those programs for which funds are directly appropriated by Parliament.

1. The Definition of Full Cost

The full cost of EDP should include all direct and indirect costs incurred by government in order to obtain the EDP outputs required by government programs served by EDP.

This definition implies both additions to and subtractions from the costs paid out of departmental or EDP centre budgets. The additions are the more obvious: they include such items as fringe benefits (which are in part budgeted centrally), common services budgeted for by one department on behalf of most (accommodation provided by the Department of Public Works, or payroll services provided by the Services Administration of the Department of Supply and Services), and some managerial services provided by central agencies (personnel management services by the Treasury Board Secretariat). The subtractions require consideration of the government program served by particular elements of expenditure, bearing in mind the purpose of associating expenditures with the program which they are intended to further. Expenditures intended to further the government's official languages program are made from most budgets, and should not be attributed as costs to programs requiring EDP outputs. Other nation-building programs may at times be implemented in part by imposing supporting costs on apparently unconnected budgets.

Some government costs now excluded from departmental budgets remain excluded under this definition of full cost. These are, in general, costs which would exist, without any directly related change in size, whether or not EDP existed, or whether or not all government EDP were in-house or external. The basic costs of parliamentary government, including the salaries of members of parliament, those of the cabinet ministers through whom the executive reports to parliament, and other support costs, are independent of the existence of EDP. The costs of government policy development and expenditure control, including most costs of the Privy Council Office, the Treasury Board Secretariat, the Auditor General's office and most Royal Commission costs, are determined by

the general level of government expenditure and the range of policies of active concern. They are not significantly influenced by whether EDP is used in implementing a policy, or whether that use involves in-house or external EDP resources.

The sorts of additions to and subtractions and exclusions from budgetary costs suggested in the preceding paragraphs are debatable, and have in fact been debated at some length in preparing this Guide. In practice, they seem likely to achieve the desired objectives of identifying as EDP costs for allocation to substantive projects and programs the significant cost elements which should be associated with those projects and programs, and of ensuring that in-house and external EDP sources are costed on a reasonably comparable basis. These objectives could not be attained if EDP costs were limited to those included in government cash budgets, or even to those costs which EDP or departmental management can control directly.

2. Adjustments to Budgetary Costs

Two basic types of adjustment to budgetary cost data are necessary to arrive at the full cost of EDP. The first is to add or subtract those elements indicated by the full cost definition. The second is to ensure that the timing of important cost entries is appropriate to the distribution technique by which EDP costs are associated with substantive projects and programs. A third class of adjustment will also be necessary in any case in which departments do not fully distribute the common service and overhead costs included in their budgets to such component units as EDP centres and staffs. These adjustments are discussed below, and summarized within the framework of the familiar Standard Objects of Expenditure in Appendix VII-1.

a. Adjustments for coverage

The principal adjustments for coverage differences between the cash budget concept and the full EDP cost concept relate to fringe benefits to employees (included in Treasury Board appropriations), payroll services and accounts payable services (included in appropriations for the Services Administration of the Department of Supply and Services), staffing services, including appeals (Public Service Commission), accommodation (Public Works Department), and personnel management (Treasury Board). Two other significant additions are not specifically funded by any department: the cost of self-insurance by the government of all government assets, and the cost of providing working capital to government agencies. There is one significant deduction, for costs associated with the official languages training program. Each of these is discussed below; all should be applied in accounting for the full costs of EDP.

There are a few other central costs which were considered for systematic inclusion, but the influence of these will usually be negligible. These include such items as the public service health program and the direct costs of the Dominion Fire Commissioner's work. The omission of these costs will be more than offset for most EDP centres by elements of indirect support to other programs included in the items mentioned in the preceding paragraph. Certain other central costs may at particular times be significant to particular EDP

centres (e.g., legal services supplied by the Department of Justice). Such costs should be included in the accounting of EDP full costs whenever they are significant, and this chapter will be revised if any of these becomes important to most centres.

These coverage adjustments will usually have to be estimated. A number of different estimation techniques could be used; the chief tests of a technique should be relevance and simplicity. Simplicity is especially desirable in order to avoid unprofitable accounting exercises, and to ensure full understanding of the costing system by persons who are not accounting experts. A simple estimation technique is suggested for most items discussed; departments are free to suggest other estimation techniques, but the use of more costly estimation methods should be justified.

i. Fringe benefits

Fringe benefits to employees include the government's contributions as an employer to the Canada and Quebec pension plans, the unemployment insurance fund, various surgical-medical and hospitalization plans, and the public service death benefit account. These are all centrally funded in Treasury Board appropriations. The costs associated with these programs depend in part on the number of employees, in part on their salary levels, in part on their sex or marital status. The precise calculation of the cost of these benefits for any specific staff would therefore be quite burdensome. The value of EDP cost records will not be significantly reduced if these benefits are simply estimated as a fixed percentage of salary costs. The Information Systems Division of the Secretariat will make available each year a percentage factor which can be used for this purpose.

Until 1973-74, the cost of superannuation benefits was also funded centrally. Although these costs are now included in departmental estimates, they are not always distributed to component staffs by the regular departmental accounting process. In such cases a percentage of salaries estimate will be satisfactory; the Information Systems Division of the Secretariat will make available a percentage factor which may be used in such cases to reflect the combined effect of superannuation and other fringe benefit costs.

ii. Payroll services

The total cost of the Public Service Compensation Administration activity is identified in the estimates of the Department of Supply and Services. This cost can most easily be distributed by establishing an average cost per employee expected to be paid for each fiscal year, and using this figure to calculate the total cost of payroll services to each EDP centre or staff. This factor will be made available each year by the Secretariat.

iii. Accounts payable services

The total cost of the Accounts Payable and Other Payments Administration activity is also identified in the estimates of the Department of Supply and Services. This cost can most readily be distributed by establishing an average cost per thousand dollars of non-salary expenditures, and using this figure to estimate the value of services received by any EDP centre or staff. This factor will be made available each year by the Secretariat.

iv. Staffing and appeals services

The cost of the staffing and appeals services provided centrally is identified in the estimates of the Public Service Commission. This cost can most readily be distributed in the same manner as the cost of payroll services; an appropriate factor will be made available by the Secretariat.

v. Accommodation

Accommodation is provided to most departments by the Department of Public Works. As a first step towards cost recovery, that department makes available to its customers a statement of the cost of accommodation provided. These data should be used to establish an average cost per square foot of space occupied by any EDP centre or staff. To this should be added an estimate of the value of assigned or occupied parking space provided without charge to employees or customers of the EDP centre. Where accommodation is not provided by DPW, estimated or actual commercial rental rates should be used for floor space and parking.

The Secretariat will review carefully the accommodation costs reported for each EDP centre and designated staff. EDP centres have usually been located in space "available" to their custodian department, sometimes without much regard as to whether this particular space was expensive or economical or even particularly well suited to operational requirements. It is estimated that existing EDP accommodation might have a rental value as much as 1/3 above that of operationally suitable space, and this excessive space cost would bear especially heavily on a few computer centres. It may therefore be necessary to adjust the accommodation costs reported by some centres for a transitional period, i.e., until these have had a reasonable opportunity to locate in economically suitable space.

vi. Personnel management

The cost of the central Personnel Management activity is identified in the estimates of the Treasury Board. This cost can most readily be distributed in the same manner as the cost of payroll services; an appropriate factor will be made available by the Secretariat.

vii. Insurance

Private EDP centres usually use insurance to protect the value of their assets and guard against business interruption and public liability. The government has always acted as a self-insurer, and for various reasons appears to have a much lower fire loss rate than is indicated by insurance industry data. There is as yet no evidence that the dangers of destruction or breakdown of computer equipment installed in government premises are significantly less than in the case of good private centres. It is therefore unlikely that the real cost to the government of self-insurance of computing activities is as small a fraction of normal insurance costs as would be true for fire insurance. This cost will have to be kept under review; as an interim measure total insurance costs for EDP centres and staffs should be imputed at 0.2% of the depreciated value of owned assets plus any liability for rented or leased assets (note that insurance may be made a contractual responsibility of the owner of rented equipment).

viii. Working capital

Working capital is the funds required to bridge the gap between the time that bills for supplies and wages of staff must be paid, and the time that payment for services is received. The amount of working capital required varies from firm to firm and industry to industry; for government EDP centres it should usually be set each year at 3 months' average planned full costs excluding imputed rentals (variations from this norm, except by centres financed wholly from revolving funds, should be made only with the concurrence of the Information Systems Division of the Secretariat). The cost of this capital is the interest that this amount would earn at the long term borrowing rate established by the Department of Finance for loans to crown corporations (cf. circular letter 1970-7, TB 693949).

The reason for this inclusion is perhaps more obvious when it is noted that private firms usually experience a lag of about 3 months between the time that they incur costs to produce goods or services for the government and the time that they receive payment. In effect this provides the government with interest-free money for this period, an advantage foregone when in-house resources are used.

Centres financed wholly by revolving funds will not usually have to make this adjustment since they are normally charged interest on their advances from the Consolidated Revenue Fund.

ix. Official languages training costs

The 1973 EDP survey indicated that about 3% of the basic EDP payroll cost to the government was accounted for by staff time used for official language training. The same proportion of staff accommodation costs and staff overhead and fringe benefit costs would apply under most circumstances. This is a significant cost which should be identified for association with the program which it supports, rather than with those programs which require EDP outputs. The survey also indicated wide variations in the percentages applicable to specific departments.

Each EDP centre and staff should record the time spent by its employees on official language courses, and cost this time at rates which take into account salaries, fringe benefits and accommodation costs. Any other amounts clearly identified with the official languages training program should also be included in this cost estimate. This total should be shown in EDP accounts as an offsetting or negative item.

b. Adjustments for timing

There are two principal areas in which adjustments to cash accounting concepts are required if EDP costs are to be adequately associated with the period to which they relate. The first is in the personnel area, the second in the area of capital expenditures. In the case of particular EDP centres there may well be other adjustments required. The peripheral cost accounting model described in Appendix VII-3 is of the accrual type in order to ensure that costs are appropriately related to time periods.

i. The timing of personnel costs

Government salary negotiation procedures tend to result in periodic large retroactive adjustments to salaries for particular groups of employees. These adjustments appear in cash accounts when paid, but actually are costs which relate to several prior months (occasionally years). Their size is sufficient to seriously distort apparent costs in the period in which they are paid. The most appropriate solution is to include in EDP personnel costs an amount estimated to be adequate to cover salary adjustments when made (this can be a percentage addition, made as part of the adjustment for fringe benefits), and make an adjustment entry at the time of payment to equate estimated and actual costs.

A similar but less easily managed problem arises from periodic actuarial adjustments in the government contribution to the superannuation account. These can not be estimated in advance either in size or in timing, and it will probably be necessary to spread them over a subsequent period to reduce distortion of current cost data. The Information Systems Division of the Secretariat will suggest an appropriate treatment for such adjustments when they occur.

ii. The timing of capital costs

Capital costs are recorded in cash accounts at the time that payments are actually made, but the benefits of these expenditures are usually spread over long periods of time. Cost-based or accrual accounting requires that capital costs be spread over the same time periods, rather than concentrated in the period of actual payment. This requires the deduction of capital expenditures from EDP cost accounts, and their replacement by asset depreciation and interest costs.

There are various alternative techniques for handling depreciation in EDP accounts. The simplest and most generally applicable (at least for centres not financed by revolving funds) is for centres to charge themselves imputed rentals on owned assets. These imputed rentals should normally be constant over the expected life of the asset, and should combine both elements of capital repayment (depreciation) and interest on capital (at the same rate as is applicable to working capital) as is done in most home mortgage agreements. For some units of equipment (e.g., some minicomputers) a diminishing balance method might be considered more realistic. The Secretariat will not question the use of constant imputed rentals in EDP accounts, but will not insist on this technique when circumstances justify the use of an alternative.

All major equipment purchases should be presented in EDP accounts on an imputed rental basis. Each centre should determine the probable life of its capital acquisitions, and their likely residual value at the end of this period, and depreciate the difference between asset cost and residual value, plus an appropriate interest element, over the probable life. Depreciation periods should be reviewed every two or three years or when plans change, and any appropriate adjustments made to reflect changes in plans.

The Information Systems Division of the Secretariat does not support the use of "standard" depreciation periods for EDP equipment. Depreciation periods should be set in relation to the specific plans for use of the asset, and may also vary with the point in the technological life-cycle of the asset at which it is acquired. Generally, equipment should be purchased only when net capital and interest costs over the expected life of the asset are less than lease or rental charges (usually at least four or five years). Relatively few units of EDP equipment have a normal life expectancy of more than eight years, except for key punches and perhaps minicomputers. To date there seem to be few cases where purchased minicomputers have been struck off inventory, and some have been in use for over ten years.

It also seems undesirable at this time to limit the acquisitions that may be treated as capital costs rather than current expenses. An installation with heavy tape costs may wish to capitalize and depreciate tape in EDP accounts. Another installation may prefer to treat tape purchases as current expenses. Major acquisitions of office furniture will usually be treated as a capital cost, but minor acquisitions may be expensed. These are decisions best taken by centre management, but should be taken on a consistent basis within each centre.

c. Adjustments for departmental services

Most EDP centres and staffs receive some support services from their custodian department, and usually these services are not charged or costed to the centres. The 1973 EDP survey confirmed that the extent of services supplied by custodian departments varies considerably among centres and staffs. Each centre or common-service EDP staff should therefore make appropriate estimates of the cost of such services received, and of the overhead costs of departmental management, for inclusion in its accounts. The same sort of simple proration techniques suggested in sub-section a., above, will usually provide an adequate basis for such estimates.

3. The Applicability of Costing Guidelines

To meet the objectives of federal government EDP policy it is necessary that all in-house EDP resources be costed. This includes all resources organized in departmental, functional and service-wide application centres as specified in the EDP Master Plan. It also includes all other departmental resources supplying any of EDP consulting, systems, programming, data conversion or machine services and all staff immediately supporting such work. It does not include departmental personnel who are only incidentally engaged in EDP work such as scientists or economists who write their own computer programs, or clerks or others who spend a minor proportion of their time operating terminals or key punches. Nor does it include the time of program staffs who negotiate with EDP staffs or monitor EDP work for the program.

Unless all in-house EDP resources are costed according to uniform principles, it will not be possible either to make visible the full cost of government EDP operations or to demonstrate that in-house resources are being used only when this is in the public interest. The requirement that all such resources be costed does not mean that equally elaborate costing techniques or accounting systems must be used in all instances. Generally, the larger and more complex the operation, the more detailed the costing will have to be to meet acceptable standards of accuracy. For small scale operations it should be sufficient to have a skeleton costing system involving no significant resource input over that which would normally be required to discharge the basic management responsibilities for planning and resource control.

The costing guidelines also apply to all external EDP resources used by government agencies for EDP consulting, analysis, programming, data conversion or machine services. The price of using such resources must be placed on a "full cost" basis to permit proper comparisons with in-house costs. The additions to contract costs which must be made will include any costs associated with tendering, contract negotiation and administration, monitoring of services supplied, and training of in-house staff to use an external facility. These costs are usually not negligible and may add as much as 25% to direct contract costs. To the extent that these services are supplied through the Supply Administration of the Department of Supply and Services on a cost recovery basis, they will be more visible than has often been the case in the past. However any sizable contract will usually also require a sizable input of in-house EDP staff time which should not be overlooked in costing.

Particular care should be taken in distributing the costs of EDP management and co-ordination, departmental management, and some departmental and central government services (especially financial services), to ensure that these bear appropriately on both in-house and external EDP services. This can most easily be accomplished by relating these costs to dollar budgets or revenues, so that each dollar of direct EDP service (whether supplied by in-house or external services) bears an even mark-up for these overheads.

The user's ability to accept responsibility for and control his project costs depends upon the availability of adequate reliable information on the cost of in-house and external EDP services. With such information he can choose rationally among EDP and non-EDP alternatives, and make a valuable contribution to the choice of an EDP supplier. The ability and freedom of users to make such choices will provide real incentives to effective EDP management performance. Where user choice is not a feasible incentive, departmental management should arrange for regular audits of the efficiency and effectiveness of EDP services.

C. THE PRICING OF EDP SERVICES

The simplest accurate method of distributing EDP costs among various user programs and projects is to put a price on each EDP service supplied and measure its use by programs and projects. Use of the price mechanism for cost distribution also facilitates comparisons of in-house and external costs, and thus assists users to determine the most cost effective sources of program or project support.

Certain management decisions are necessary as a basis for the pricing of services. One relates to the pricing structure: which services shall be charged for and which provided as "overheads". A second relates to the types of pricing to be used, and the circumstances under which each might be used. A third relates to the extent to which prices must or should be set to equate expenses and revenues. These decisions are basic to the design of an effective pricing system for any EDP operation.

It must be made clear at the outset that use of the pricing mechanism does not require cost recovery. Pricing, and the real or pseudo revenue data which derive from it, provides an invaluable guide to management regarding the efficiency and effectiveness of a centre's operation relative to its competition. Prices are a guide to users of EDP resources in sourcing their requirements. These uses of prices and pricing data apply regardless of whether money actually flows from user to provider of EDP services. The following discussion makes no distinction between the case where money flows and real revenues are received, and the case where only information flows and pseudo revenues are calculated. It is nevertheless recognized that, especially for users, a real pricing system with money flows and with freedom to make alternative uses of funds, is likely to be a sturdier goad to efficiency than is a system involving information flows only.

The emphasis in this chapter on the use of pricing for cost distribution and as a basis for the overall evaluation of a centre's relative performance is not intended to suggest sole or even principal reliance on this mechanism for management control. Comparisons between actual and budgeted costs (both in total and at the service and project levels) and physical performance measurements are also essential management tools. However, these other tools do not usually provide an adequate basis for inter-centre comparisons or comparisons with the private sector, and a better basis for such comparisons is essential to the implementation of the EDP policy approved by the Treasury Board.

1. The Pricing Structure

The greatest danger in any commercial or pseudo-commercial situation is that certain parts of the product line will be unprofitable and become a drag on the total operation. These may be either "traditional" services for which demand is dying or costs rising, or new services which do not develop as expected but for which high costs must be incurred. The pricing structure adopted for any EDP centre or staff should ensure the visibility of revenue from each important EDP service component so that the viability of each can be separately assessed.

The pricing structure appropriate to any EDP unit will depend on the nature of the services which it provides. As a minimum standard, there should be separate pricing of each of the services listed in the Classification of EDP Services (Appendix VII-2) and which is provided by a centre or unit. The contents of these service classes are described in Appendix VII-3, section F.4

In particular cases it may be desirable to provide for separate prices for separate computer configurations (subdivide EDP Service 1.09), or for key punching and key-to-tape (subdivide EDP Service 1.50). It may be desirable to distinguish and price separately different classes of programming work (e.g., new development vs maintenance and optimization) or even programming in different languages (both methods of subdividing EDP Service 5.70). These are decisions which must be taken by the appropriate level of management in each instance. Any additional price structure components should be relatable to the Classification of EDP Services in such a way that the standard totals can be derived by aggregation.¹

2. Alternative Pricing Techniques

There are a number of possible methods of pricing particular EDP services. This section reviews some alternative methods.

a. Competitive pricing

In this mode, prices are normally set to meet or beat the competition, although in order to discourage certain types of business they may sometimes be set to *exceed* the competition on particular types of jobs. Competitive pricing must also consider such important factors as the availability of competitive services, the reliability and quality of services offered, customer acceptance of services and prices, any special features of services offered, the likely volume of sales, and the full cost of providing the service.

Competitive pricing is usually characterized by a price schedule under which all customers may obtain services under the same conditions and at the same prices. This is the price schedule referred to in directives 5.3 and 5.4. The existence of approved price schedules does not preclude special pricing arrangements in appropriate circumstances.

When using this system it is necessary to keep the prices of competitors under constant review, and there is some danger of becoming involved in unrealistic price cutting to protect or increase a centre's market share.

b. Job pricing

In this method, a fixed price or per diem rate to a fixed ceiling is quoted for a job. This type of arrangement should always be covered by a firm contractual agreement. It is often preferred by users who require assurance that a job will be completed within definite cost (and time) limits. Successful use of this type of pricing requires full awareness of likely costs when setting a job price (detailed firm specifications), and effective controls to ensure that expenses remain within the revenue to be generated. It will often be appropriate when disposing of surplus capacity for short periods.

1. Some pricing system designs and considerations are discussed in EDP Analyzer, November, 1973.

c. Incremental (marginal) cost pricing

This is often used as a method of obtaining a sufficient volume of business to provide a basis for economic operations. Under this system prices are normally set to cover any increases in variable costs that will result from additional business, plus a partial contribution to overheads. It may be appropriate to large "one-time" jobs, especially where these will make use of otherwise unmarketable existing capacity. It is usually not appropriate for recurring jobs, or jobs which will necessitate increased capacity.

The danger with this type of pricing is that it may cause downward pressure on the regular price structure to retain existing customers who resent being "discriminated against", or result in the acquisition of equipment or operation of extra shifts whose overhead costs add to the burden on regular business. Centre advisory boards or committees (or senior departmental management for departmental centres) should always be aware of and approve each use of incremental (marginal) pricing.

d. Cost-based pricing

This system adds a percentage, a fixed amount, a negotiated amount or no mark-up at all to the cost of providing a service to a particular customer. The chief disadvantage of this method is that it tends to remove the incentive to minimize costs. It can, however, be advantageously employed (especially where the add-on is not merely a percentage) in the case of high risk activities whose costs can not be estimated with reasonable accuracy, or in the case of brokerage activities.

e. Administered pricing

This type of pricing occurs when prices are determined by rate-setting tribunals or combines of suppliers (the latter are usually illegal in Canada) rather than by market forces. It is not expected to be of much relevance to government EDP operations.

3. Price Determination

The senior management responsible for any EDP unit should determine the price structure to be used by the unit, the allowable types of pricing, and the extent to which prices should attempt to equate expenses and revenues for any period of time, subject to the directives and guidelines cited at the beginning of this chapter. Competitive-type price schedules, expected to be in effect in the fiscal year following their approval, must be included in Annual EDP Plans and approved by the Treasury Board, but authority is delegated to modify approved schedules to meet changing conditions, and to negotiate special pricing arrangements when appropriate. Annual EDP Reports must show the extent to which revenues were derived from schedule prices or from special pricing arrangements; this is intended to ensure that the burden of EDP overhead costs is not unfairly concentrated on a selection of "captive" users of any facility.

It is expected that actual or pseudo revenues for any EDP centre or common-service EDP staff will at least equal full costs over a reasonable period of time, though circumstances in any particular year may make it desirable (or inevitable) to operate at a surplus or deficit. Departmental management should ensure that any EDP services supplied by small internal service units are competitive with those offered by EDP centres and common-service staffs, and should find the price schedules of these centres and staffs a useful evaluation guide.

In cases where competitive revenues do not equal or exceed full costs, and there is not a plan which is likely to alter this situation, then departmental management should consider whether that EDP unit should continue to exist. In such cases, evaluation of the EDP unit should take into account the cost of any special features (such as high security or back-up) which the unit must provide. These costs should be compared with the costs of alternative ways of obtaining equal security or back-up.

D. ACCOUNTING FOR COSTS AND REVENUES

Adequate records and reports of costs and revenues are essential if the visibility of costs required by EDP policy is to be achieved, and if decisions regarding the use of EDP are to be influenced by valid cost comparisons. However the adequacy of records and reports must be judged in each case by their value in contributing to sound management decisions, rather than by abstract standards.

Because of the differences in purpose, concepts and coverage between the accrual or cost-based records required for EDP units and the regular cash-based government accounts, the EDP records will usually have to be peripheral to the regular government accounts. Although peripheral, they should normally be related to cash accounts and should use the same inputs to the extent possible in order to minimize duplication of accounting effort. When feasible, they should be fully integrated with the main cash accounts as recommended in the "Guide on Financial Administration", which states:

"Departmental accounting systems should be designed to provide accurate, periodic cost information on the activity elements involved in carrying out departmental programs. Where cash disbursements are not significantly different from costs, cash information will satisfy this requirement for cost information. This requirement is to provide for relating costs to benefits; for comparing efficiency over a period of time or among similar responsibility centres; for determining the amounts to be recovered when services for which a charge is appropriate are provided to the public; and for comparing revenues recovered against the related costs. Accrual information should be entered into accounting systems to the extent it is necessary to facilitate the provision of cost information."¹

1. Guide on Financial Administration for Departments and Agencies of the Government of Canada: Treasury Board Secretariat, September, 1973, Part II, p. 8.1.

As this guideline states, cash information is frequently an adequate proxy for cost information. In the case of small computers or small EDP units serving a single project or activity, it may be adequate to obtain EDP cost data by applying simple adjustments to cash data, and to estimate EDP pseudo revenues from performance or output data. Larger and more complex units providing a variety of services to a variety of customers will usually require more primary accounting of both costs and revenues.

One characteristic which should apply to EDP cost records is prompt availability. Cost data is most useful for management and control if available promptly after the close of each accounting period. EDP management requires current cost and revenue data to judge the success of its efforts and identify problems, user management requires current awareness of the value of each type of EDP service consumed by their projects to control costs. However even promptness is relative; where costs and usage are stable and small, accounting periods need not be as frequent, nor data available as promptly, as where costs and usage are larger and more variable. Monthly reports to customers of the value of services consumed must be regarded as a norm from which there may be departures in either direction. Such departures should always be subject to the agreement of both supplier and user.

With any form of accounting activity there is always the danger of pursuing a standard of accuracy which costs more than it is worth, and this danger is perhaps especially acute in the measurement of computer usage. It is well known that when several programs are active in a computer concurrently, the measured usage of the machine by any one will be affected by the presence of the others. Much effort has been expended to develop measurement systems which will yield "repeatable" charges for a program, regardless of other concurrent activity, but often insufficient thought is given to whether the value of reducing the margin of variation of charges for a program from, for example, 5% to 1% is really worth the additional cost (which must be borne by the users) in software effort and overhead use of the machine by the job accounting system. Greater equitability and realism in charges might often be achieved with a greater, rather than a lesser, toleration of repeatability variances!

Appendix VII-3 outlines a cost accounting model intended as a basis for adequate accounting of costs and revenues in a fairly large and complex EDP centre. Although its basic classifications are designed specifically for EDP, it provides parallels to the responsibility centre, activity, and object of expenditure data required by government accounting. It makes use of the classifications of EDP Services (the "activity" equivalent) and EDP Expenses and Income (the "object" equivalent) presented in Appendix VII-2, and provides illustrations of the intended content of both. The Treasury Board requires regular reporting of the financial results of government EDP operations in terms of these classifications.

The model is not intended to be rigidly applied. It merely illustrates the principles which must be considered in designing a suitable system, the reports which might be produced, and the relationships to the regular government cash system which must be provided for in design. Departments and EDP centres should tailor their own EDP costing systems to their own managerial requirements and to the basic reporting requirements of the Treasury Board, taking into account the level of accuracy and detail which are appropriate in each instance. It is particularly important that internal cost, revenue and performance reports be in terms meaningful to their recipients, and emphasize the information (and variances) relevant to their work.

E. THE FINANCING OF EDP ACTIVITIES

Funding methods now in use in the federal service are still under review, and it is not desirable to take a firm position on the financing of EDP units until this review is completed. Three present funding methods might be appropriate for EDP units, depending on the market served and whether cost recovery is considered desirable by departmental management: appropriations, vote netting and revolving funds.

Appropriation funding is suited to EDP units providing services within a single department, and particularly to a single program, although it can be used where incremental costs are recovered from other departments. Its use would require supplementary accounts for EDP units, which would have to be integrated with regular departmental accounts.

Vote netting is suitable when some EDP costs are recovered from other departments. Its use would also require integrated supplementary accounts for EDP units.

A revolving fund is most appropriate where an EDP unit provides service to a number of departments and programs, or where full recovery of costs from users is desired. Its use allows independent accounts for EDP units which do not duplicate other accounts. It is also the only one of the three techniques which may permit carrying forward both assets and liabilities from one fiscal year to another.

If cost recovery is implemented, then regardless of the means of financing selected, an EDP unit will be expected to recover some costs which are unlikely to be payable from its budget (most of the costs discussed in sub-section B.2.a, above). The amount of these costs should be paid to the Receiver General as non-tax revenue. Where cost recovery is not in effect, but "zero budgeting" is used for in-house EDP activities, the charges for EDP services will likewise tend to be greater than the budgetary costs of their providers, which may require an equivalent balancing entry in departmental accounts (not in EDP accounts).

The decision as to whether particular EDP units should recover their costs from users is left, for the present, to departments and agencies. The aim of these guidelines is to produce the visibility, comparability and accountability for EDP costs required by EDP policy. There will be an appraisal of experience with these guidelines to determine the degree of achievement of the policy objective of better use of EDP resources by both EDP managers and EDP users, and the modifications necessary for further progress.

Regardless of the method of financing selected, or of whether cost recovery is implemented, it is essential to effective EDP planning and efficient EDP use that users be required to budget for their EDP services, that their use of services be charged against their budget, and that any use in excess of budget be approved by a senior level of management (preferably including EDP management if cost recovery is not in effect). Without such budgeting it is unlikely that users will have sufficient incentive to attempt to control their EDP costs, and management is likely to lose control over this important resource to technical experts.

**COSTS REQUIRING SPECIAL TREATMENT IN EDP ACCOUNTS,
WITHIN FRAMEWORK OF STANDARD OBJECTS OF EXPENDITURE**

Standard Objects	Notes
01 Personnel	<p>1. Include salaries, overtime and any fringe benefits included in departmental budgets, plus estimated shares of any of the following which are not included in the departmental or agency budget: Government's share of surgical-medical and other insurance premiums and taxes, and of contributions to the Unemployment Insurance Account in respect of Government employees; Government's contributions as an employer under the Canada Pension Plan and the Quebec Pension Plan and the Public Service Death Benefit Account.</p> <p>2. Include estimates of actual amount necessary to provide for retroactive salary payments, plus an adjustment entry at time of contract settlement to equate estimated and actual costs.</p>
02 Transportation and Communications	No special requirements except as noted under Standard Object 12.
03 Information	No special requirements except as noted under Standard Object 12.
04 Professional and Special Services	<p>1. Include estimated cost of service supplied by any of the following if not included in the departmental or agency budget: Public Service Compensation Administration and Accounts Payable and Other Payments Administration (DSS); Staffing and Appeals (PSC).</p> <p>2. Include estimates of the cost of other services supplied without charge by other government agencies (e.g., legal services by Department of Justice) if these costs are significant (1% of full costs).</p>
05 Rentals	<p>1. Include rental value of accommodation occupied (including assigned parking space) at rate indicated by DPW or at estimated or actual commercial rate where other than DPW accommodation is used. The TBS may adjust rentals to be included in accounts for a transitional period.</p>

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Standard Objects	Notes
	2. Include imputed rentals for owned equipment and other owned assets, equal to depreciation plus interest on "borrowed" capital.
	3. Include in annual balance sheet as an asset, the depreciated value of purchase credits earned on rented equipment.
06 Purchased Repair and Upkeep	No special requirements except as noted under Standard Object 12.
07 Utilities, Materials and Supplies	No special requirements except as noted under Standard Object 12.
08 Construction and Acquisition of Land and Buildings	This object will not normally be used in EDP full cost accounting because the capital cost of buildings and improvements is excluded from current cost accounts. Any owned land or buildings should be shown only on annual balance sheets as assets. An imputed rental should be included in Standard Object 05.
09 Construction and Acquisition of Machinery and Equipment	This object will rarely be used in EDP full cost accounting because the capital cost of machinery and equipment is excluded from current cost accounts. Owned capital assets will usually be shown only on annual balance sheets as assets. An imputed rental should be included in Standard Object 05.
12 All Other Expenditures	<ol style="list-style-type: none">1. Include interest on working capital. For EDP units not financed by a revolving fund, working capital will be set each year, usually at 3 months' average full costs (excluding imputed rentals). The interest rate will be the long term borrowing rate established by the Department of Finance for loans to crown corporations.2. Include imputed cost of insuring equipment and other assets.3. Include a calculation of the salary and other incurred costs of staff on official language training, and any out-of-pocket expenses involved in such training. <i>This amount is to be shown as a deduction from costs.</i>

Standard Objects**Notes**

-
4. Include allocated or estimated cost of services supplied by the custodian department. These costs will include an appropriate share of the costs of the offices of the deputy minister and the assistant deputy minister through which the EDP group reports. They should include specific charges for those personnel, financial, stenographic and typing, supply order processing, records management, mail and messenger and other services which are supplied on a common basis.
5. Include estimated share of the following general government overhead cost: Personnel Management (TBS).

CLASSIFICATIONS OF EDP SERVICES AND OF EDP EXPENSES AND REVENUE

These classifications should be used in EDP full cost accounts to ensure that the requirements of directive 5.5 and guideline 5.9 are met. The content of each item is described or illustrated in Appendix VII-3, Part F. They may be modified as described in Chapter VII and Appendix VII-3.

The code shown for each classification group and class merely provides an independent reference number for each. These codes were not designed for actual application (a two digit code would be adequate in practice). Departments and EDP centres should use codes that fit their own accounting systems.

EDP SERVICES		EDP EXPENSES AND REVENUE	
Code	Group and Class	Code	Group and Class
1.	Computer and Related Services	1.	Personnel Related
.09	Computer processing	.02	Salaries
.40	Document reading	.05	Employee benefits
.43	COM services (computer output to microfilm)	.08	Consultants and contract staff
.46	Auxiliary and unit record services	3.	Equipment Related
.50	Data preparation services	.12	Production equipment rental — actual
.59	Computer and related services n.e.s. (not elsewhere specified)*	.15	Production equipment rental — imputed
		.18	Production equipment maintenance
5.	Systems and Programming Services	.21	Data transmission costs
.60	Systems services	.24	External facilities
.70	Programming services	.27	Software acquisition
.79	Systems and programming services n.e.s. (not elsewhere specified)*	4.39	Production Supplies
		5.	Accommodation
		.44	Accommodation
9.	Other EDP Services	.48	Office furniture and equipment
.91	Training services		
.95	Brokerage services		
.99	EDP services n.e.s. (not elsewhere specified)*	6.	Other Centre Costs
		.52	Travel
		.55	Printing and stationery
		.58	Telephone and telegraph
		.61	Interest on working capital
		.69	Other expenses

* These three classes would be used chiefly to collect administrative expenses and overhead costs.

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EDP SERVICES		EDP EXPENSES AND REVENUE	
Code	Group and Class	Code	Group and Class
7.	Shared Costs		
.72	Departmental costs		
.75	Government costs		
.78	Language training (deduct)		
8.89	Internal Charges		
9.	Revenue		
.90	Revenue from users		
.94	Appropriations and other revenues		
.98	Credits and unbilled charges (deduct)		

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	August, 1974

APPENDIX VII-3**COST ACCOUNTING SYSTEM MODEL FOR EDP CENTRES AND STAFFS**

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1. The abbreviation "N.E.S." means "not elsewhere specified".

**COST ACCOUNTING SYSTEM MODEL
FOR EDP CENTRES AND STAFFS**

A. INTRODUCTION

This accounting system model was developed to assist federal government EDP centres to establish and make visible their costing, accounting and financial reporting. It consists of a set of accounting principles and concepts recommended for adoption, basic classifications for use in accounting for costs and revenues, recommendations regarding implementation and integration with existing departmental systems, and samples of the types of reports which might be required from the system.

The model is designed to meet information needs for management control and monitoring of costs, revenues and results at both the project and the EDP centre levels; for planning and budgeting; for decision-making in choice of EDP services (including "make or buy"), equipment procurement, and service pricing. More specifically, it provides for:

- disclosure of the full costs of EDP operations, whether incurred directly by EDP centres or by others for their benefit,
- matching of costs with revenues, in a manner facilitating meaningful comparisons with the private sector,
- billing of EDP services to users,
- identification of the assets and liabilities of EDP centres,
- adaptability to the method of financing selected for each centre, and to the varying sizes and ranges of service of EDP centres,
- correlation with the requirements of the regular federal government budgeting and cash accounting systems.

The information produced by the model should be useful to five distinct audiences:

- EDP centre management (including responsibility and cost centre management) for planning and control of service activities,
- departmental management (including EDP centre advisory boards and committees) for overall monitoring, control and planning of centre activities,
- users of centre services, for planning and control of project costs, and as a basis for incorporating EDP costs into program, activity and project costs,

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- financial administrators (in the centre, custodian department or user department) for financial analysis, accountability, guidance and control, including appropriation and allotment control,
- the Treasury Board Secretariat, for monitoring EDP activities and projects, for monitoring adherence to guidelines and for budget development and control.

This model describes and emphasizes the sort of financial records and reports which generally exist in the private sector and have generally not existed for federal government EDP organizations. This emphasis should not be interpreted as suggesting that financial records and reports can provide an adequate basis of management information by themselves (cf. chapters IV and VIII of this Guide). They do, however, represent the most useful and feasible common denominator for all the differing EDP environments in the public service, and for comparisons with the private sector. It is essential to the implementation of the EDP policy of the Treasury Board that such records be brought into existence.

B. ACCOUNTING CONCEPTS – GENERAL

1. A Subsidiary System

A subsidiary or peripheral double entry accounting system should be established to record the costs, revenues, assets and liabilities of each EDP centre. Responsibility for maintaining the accounting system, preparing records and producing financial reports may rest with the centre or the host department. The extent to which the subsidiary accounting system is integrated with the host department's system will depend on the centre's financial information needs and the flexibility of the existing departmental system. An illustration of linkage between EDP centre and host department accounting systems is included in Part G.

In the absence of a revolving fund mode of operation, centre accounts will credit to memorandum accounts the imputed charges and credits for costs not included in cash budgets, such as departmental and general government services, employee benefits, accommodation and interest.

2. An Accrual System

Significant EDP revenues and costs should be recorded on an accrual basis. Receivables and unbilled revenue should be carried as assets in memorandum accounts. Liabilities, such as accrued payrolls and equipment rentals, should be recorded as accounts payable or set up each accounting period and reversed the following period after the payment entry has been made. Estimates of retro-active salary payments should be accrued.

The revenue and cost data produced by the system should be reconciled monthly to the mandatory cash-based government accounting system, by reference to the memorandum accounts for assets, liabilities, accruals and imputed amounts.

3. Classification of Accounts

Revenues and costs should be accumulated in accordance with the classifications of EDP Services and of EDP Expenses and Revenue defined in Part F of this appendix. These classifications may be expanded to satisfy individual EDP centre preferences or to meet a need for greater detail. Line object accounts and codes should be established by the centres to support the EDP Expenses and Revenue classes as illustrated in section F.5. These accounts and codes should be selected to meet the needs of the centre and the host department.

The EDP Services classification is designed to be the EDP equivalent of the Activity classification used in regular government cash accounting. The EDP Expenses and Revenue classification is the equivalent of the regular Objects of Expenditure classification. The use of distinctively different names is intended to avoid confusion between these EDP cost accounting tools and the regular cash accounting tools.

Revenues and costs should also be accumulated by responsibility and cost centre, with appropriate use of the EDP Services and EDP Expenses and Revenue classifications. The responsibility and cost centres should be determined by EDP centre management.

The responsibilities of the EDP centre director may not match exactly with EDP services (he may be responsible for non-EDP activity elements, or there may be EDP services in the department which are not under his jurisdiction). A reconciliation of EDP service reports and EDP responsibility reports should be prepared each accounting period.

4. Exclusions

Utilization statistics by individual machine or class of machine, other equipment statistics such as re-run causes, down-time or maintenance time, and customer service statistics such as turnaround time and delays, should be accumulated in a performance measurement system and should not form part of the accounting system (cf. Chapter VIII).

C. ACCOUNTING CONCEPTS – COSTS

1. Full Cost Allocation (EDP Services)

Full costs of EDP services and service elements need only be computed annually or at times of significant change to assist in billing rate determination. Full costs should include directly assigned costs and allocated costs for salaries, accommodation, administration and common services. Allocations of costs should be calculated on orthodox bases such as square feet of space, man-years, percentages of salaries or direct costs, and estimates of service and resource usage.

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2. Direct Cost Allocation (EDP Services)

Cost directly relatable to revenue-producing or support services or service elements should be assigned thereto, except for minor items which may be collected in "not elsewhere specified" (n.e.s.) classes as appropriate. Employee benefits should be charged to EDP service elements on the basis of a predetermined percentage of salary costs established by the Treasury Board Secretariat. Accommodation costs should be charged to EDP service elements on the basis of space occupied and at rates established in each centre in relation to charges from the Department of Public Works, or others, to the host department. Leasehold improvements should also be charged.

3. Charges to "N.E.S." Classes (EDP Services)¹

Charges to "n.e.s." classes should include administrative functions per se and general overhead costs not readily chargeable to or significant to specific EDP services or service elements. Centre-wide overhead costs and common services supplied on a no-charge basis should normally be charged to "n.e.s." classes by book entries. The amounts of these costs should be predetermined annually through broad estimates of the extent of services provided and resources utilized, expressed as a proportion of man-years or dollar budgets. The Treasury Board Secretariat will provide information to assist in determining appropriate cost figures for general government services.

Interest on working capital should be charged to "n.e.s." classes by centres not financed through a revolving fund. The rate should be the long term borrowing rate established by the Department of Finance for loans to crown corporations. Centres not on revolving funds will have their working capital determined as described in section B.2.a.viii of Chapter VII. Centres financed through revolving funds will be charged interest on monies drawn from the Consolidated Revenue Fund together with interest on the imputed value of assets owned at the time the revolving fund is established.

The salary and other costs of employees on official language training should be a deduction from the costs of the centre. These can usually be accumulated in a single "n.e.s." class (9.99).

4. Treatment of Capital Costs

Significant fixed assets should be recorded as assets through memorandum accounts. The economic life of assets and their residual value should be estimated by centre management and reviewed by the Treasury Board Secretariat at the time the assets are acquired. A centre may change the economic life of assets for depreciation if events subsequent to the original estimates show that a change is desirable.

1. The abbreviation "n.e.s." means "not elsewhere specified".

An imputed rental for each owned asset should be charged in centre accounts. Imputed rentals should usually be charged at a level monthly amount over the estimated economic life of the asset. The imputed rental should be equivalent to depreciation of the difference between cost and expected residual value of the asset, plus interest on the purchase cost. Depreciation periods should be reviewed at least every two or three years — more often when there are major changes in plans — and appropriate adjustments made to imputed rental rates. When an asset is taken out of service or disposed of, any undepreciated balance plus any shortfall in recovery of its assumed residual value should be charged to losses.

Fixed assets may include owned computers or other equipment, furniture, site preparation, leasehold improvements, or system software acquired. They will not usually include tapes or disks, unless in the opinion of the centre the charging of tape or disk purchases to current expenses will distort seriously the periodic or annual operating results of a centre. Fixed assets owned at the inception of the system should be set up as if the system had applied from their date of purchase.

Cards, paper and other supplies will normally be charged to current expenses as purchased, without recording inventories of these as assets, unless in the opinion of the centre the charging of supplies to expenses will distort seriously the periodic or annual operating results of a centre.

5. Miscellaneous

Expenditure commitments for future periods should be recorded either through formal commitment accounting routines or through memorandum period-end entries. Commitments should only be shown in responsibility reports, not in EDP service reports.

Purchase credits under an option to buy leased equipment should only be accounted for in the balance sheet on a memorandum basis unless and until the option is exercised. The value of such credits should be reduced in line with depreciation of the value of the equipment for whose purchase they could be used, if only to ensure that the purchase credit value never exceeds the residual value of the equipment.

Internal non-billable projects may be established if desired to accumulate the time and cost of system software development, but such costs normally should be expensed rather than capitalized as a fixed asset.

D. ACCOUNTING CONCEPTS – REVENUES

1. Revenue Records

Revenue records should identify the EDP services, users and projects generating the revenue, and include detail on revenues by elements of the rate structure. Revenue class 90 should include both billed and unbilled work. All revenues directly relatable to particular services should be assigned thereto.

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The EDP service classification of revenues will disclose the principal types of service performed, and supporting detail by rate structure elements will be available in the underlying revenue records.

Where cost recovery is in effect, accounts receivable and receipts records should be kept on amounts due and collected from users.

2. Billing Structures

Algorithms and other billing rate structures should be used to price all computer processing, data preparation and any significant ancillary services provided by the centre. Distinct computer configurations, and their associated equipment, may be billed and accounted for separately, even though situated in the same EDP centre.

Hourly or per diem billing rate structures, based upon personnel category and level, should be used to price all systems and programming staff services. In cases of fixed price contracts, the hourly rate structure will provide a measure of performance.

System software development and maintenance services usually should not be charged directly to customers, but should be recovered through billings for computer services (and perhaps data preparation). Personnel in machine service and administrative units will not normally charge time to EDP projects. Their costs should be recovered through billings for machine services and for systems and programming staff on projects.

3. Charges to Projects

All use of equipment and other billable resources will be measured (by project) for input to the billing system and the performance measurement system. Systems and programming staff time (by project) will be recorded for input to the billing system. The levels of prices used in the rate structure will be set by each centre and should take into account competitive rate levels, the historical and budgeted costs for the service, the levels of resource utilization expected, and the likely impact upon operating results. Costs directly assignable to individual EDP projects, such as travel, program testing and external consulting assistance, should when possible be specified in customer bills.

Use of machine services by systems and programming staffs of the centre (e.g.: to test application programs and system software) should be charged to the applicable EDP service, project and responsibility centre, in accordance with the billing rate structure or other applicable arrangements. Use of personnel resources based elsewhere in a centre (e.g., use of planning or system software staff for applications programming) should be charged to the customer EDP project and responsibility centre, in accordance with the hourly billing rate structure. Other costs directly assignable to individual EDP projects, such as travel, program testing and external consulting assistance, should be billed to the project as well as charged to the applicable line object.

Use of external computer services should be billed to users in accordance with centre policy: at the external cost incurred (with or without an add-on), at the amount chargeable if processed internally, or on some other predetermined basis.

4. Non-Billable Charges

Such internal services as are not re-billable directly to external customers, together with credits and re-runs, should nevertheless be recorded in revenue class 90 at the rates set in the billing rate structure, and offset by a deduction from revenues in class 98. This procedure should also apply to billing rate structure charges in the case of all projects for which special pricing arrangements are in effect.

5. Billings

Billings should be made in accordance with user contracts or other billing arrangements. These may be amounts computed through the billing rate structure plus directly assignable costs, or may be other amounts determined by the provisions of specific contracts such as fixed prices, ceilings, etc. Variations between actual billings and computed billings should be accounted for.

Services should be billed to users monthly or in accordance with user contracts or other billing arrangements, with appropriate detail of user account and project and service supplied. This may require a centre to carry unbilled work as an asset until the billing date has been reached.

E. FINANCIAL REPORTING CONCEPTS

1. The Financial Reporting System

Each EDP centre should design a financial reporting system to meet the needs of the various levels of centre management, and the reporting requirements of the Treasury Board Secretariat. The system should provide for an adequate flow of essential management information on at least a monthly basis, and for periodic reports on items of special or occasional concern.

Information included in financial reports should be drawn from several sources: the planning and budgeting system, the performance measurement system, the project control system and the accounting system. It is especially important to formulate or reformulate the information contained in the annual budget or estimates to match the format of regular financial reports on the centre as a whole and on its responsibility and service units. While a particular work volume must usually be assumed as a basis for the budget itself, its reformulations may usefully present alternative estimates of costs and revenues at other volume levels to assist in the analysis of variances.

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2. Internal Reports

The basic reports which should normally be available monthly within each EDP centre include:

- revenues and costs for each EDP service and service element, and for the centre as a whole,
- revenues and costs for each responsibility centre and cost centre,
- costs and progress on significant projects (especially for systems and programming work),
- statistics on work volumes and resource utilization both for equipment and for systems and programming staff.

Costs and revenues should be presented in sufficient detail to permit managers to analyse changes or variances from plans and, if necessary, devise and recommend remedial measures. Comparisons with plans, budgets or information for previous periods should always be included.

Other reports which might be useful on a monthly or periodic basis include:

- cash flow reports (where funding is by revolving fund or vote netting),
- trend reports on key indicators of costs, revenues, work volumes and utilization,
- projections of operating results compared to budget,
- revenues by user, project, EDP service, and pricing structure element,
- receivables and unbilled work by user, with date of billing,
- appropriation and allotment control reports,
- analyses of costs and/or revenues.

Samples of possible report formats are included in Part I.

3. External Reports

Reporting to users should be in terms of billings for services rendered, with appropriate details of charges by service, by elements of pricing structures, and by job. Every effort should be made to keep these reports as current as possible, and to provide periodic summaries of user accounts.

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Reports for senior management and the Treasury Board Secretariat should include a brief commentary on any major developments in the reporting period, including the causes of variances, their impact on results, and action taken.

F. ACCOUNT CLASSIFICATION AND CODES

Full cost accounting and the preparation of financial reports must be based on the consistent classification of all significant items of revenue and expense within an EDP centre. The collation of information at the total government level requires a basis of consistency among EDP centres. The chart of accounts outlined here provides both a core of common requirements for the uniform collection and reporting of financial data and examples of areas of option for centre reporting requirements.

EDP centres are expected to modify the chart of accounts (while still retaining the common core provided by the EDP Services and EDP Expenses and Revenue classifications):

- by creating responsibility and cost centre codes to conform with their existing organizational relationships,
- by expanding or contracting the number of EDP services and service elements to reflect their unique operations,
- by expanding the number of EDP Expenses (and Revenue) classes, and creating line objects of expenditure to meet their own specific information requirements.

Any expansion of either the EDP Services or the EDP Expenses and Revenue classification must relate directly to the basic classifications shown in Appendix VII-2 (one to one or many to one).

The importance of account classification and coding is indicated by Table 1, which presents an overview of the elements of the accounting and financial reporting system that might be required for a large EDP centre.

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1. Code Structure

The mechanics of account coding are discussed in the "Guide on Financial Administration", Part II, Chapter VIII, and the underlying classification requirements in Part II, Chapter IV. Persons not familiar with these topics should consult that Guide before attempting to implement a classification and code of accounts for an EDP centre. In reading that Guide, it must be remembered that the EDP Services classification is the EDP equivalent of the Activity classification described therein, the EDP Expenses and Revenue classification the equivalent of the Object of Expenditure classification.

A possible coding format for EDP centres is shown below. In practice, collator codes should be used to simplify coding: e.g., a four digit collator code could be substituted for the sections marked with an asterisk (*).

Source Code	EDP Centre	Code Vote	Responsibility Centre	EDP Service Group	EDP Service	EDP Service Element	Line Object	Project No.
xx	xx	xx	xx	x	xx	x	xxxx	xxx
Source Code	Indicates data source, such as journal entry number or cheque number.							
EDP Centre	Departmental number identifying the EDP centre.							
Code Vote	Indicates major classification: the parliamentary appropriation, Treasury Board allotment or asset or liability account.							
Responsibility Centre	The responsibility or cost centres to which transactions should properly be charged or credited. The first digit could indicate the responsibility centre; the second digit the cost centre, if any.							
EDP Service Group	Identifies each major group of the EDP Services classification. Must be compatible with the classification defined in this model.							
EDP Service	Identifies the EDP service classes within each major group. Must be compatible.							
EDP Service Element	Identifies the lowest level of EDP service to which a transaction need be charged or credited. This level of detail would be established to meet centre needs, and must be additive to the EDP service classes defined in this model.							

TABLE 1. OVERVIEW OF ACCOUNTING AND FINANCIAL REPORTING SYSTEM

	Input from other systems	Data input	Transaction documents	Accounting records	Functional reports	Management reports
Computer and Related Services	Revenue budgets User service contracts Usage billing rates Other service rates Equipment utilization performance data	User usage of equipment and other services	User bills, by application	Billing detail and summaries	Billings, by user and application Billings by revenue element	Operating results by service Equipment utilization summary
Systems and Programming Services	Revenue budgets Project budgets Personnel billing rates Project schedule and technical status	Personnel time sheets Project direct expenditures	User bills, by project	Billing detail and summaries Project cost records	Billings, by user and application Project cost status Personnel time utilization	Operating results by service Project cost summary Personnel utilization summary
Costs	Cost budgets Appropriations and allotments	Personnel time Supplier invoices Revenue collections Accruals Internal cross-charges Common service cost schedules Commitments Imputed rental, amortization, etc. of owned fixed assets	Paylists Disbursements Receipts Vouchers for accruals, internal charges, common services, commitments, imputed rentals, etc.	Distribution of payroll costs, disbursements, receipts, etc. to accounts Transaction registers by responsibility, service, line object Memorandum asset records — receivables, unbilled work, fixed assets	Responsibility centre cost reports Appropriation and allotment control reports Reconciliation of cost-based and cash-based accounts Reconciliation of responsibility reports with EDP service reports Billings receivable Reports for Public Accounts Assets and liabilities	Operating results by service Responsibility centre summary Expenses and revenue by service

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Line Object	Indicates the nature of the goods or services acquired or consumed or the nature of revenue earned; must be in a one-to-one or many-to-one relation to the Standard Objects of Expenditure, the Economic Objects and the EDP Expenses and Revenue classes.
Project No.	Identifies the project against which the expenditure will be charged or the revenue credited.

Additional codes could be added to provide such other information as may be required for departmental reporting, e.g.:

Province	To indicate province in which expenditure was made, or from which revenue was received.
Machine No.	To identify each individual computer or other piece of equipment owned or rented by the EDP centre.

2. Source Codes

Centres should usually use the source codes existing within their departments to code:

- Cash input sources such as
 - brought forward amounts,
 - Central Pay Division refunds,
 - revenue (deposited in bank),
 - journal vouchers, internal and interdepartmental.
- Accrual, commitment and budget input sources such as
 - accruals,
 - accrual reversals,
 - commitments,
 - responsibility budgets — annual, month and year to date,
 - EDP service budgets — annual, month and year to date.
- Local service office codes
- Cheque series input source codes

3. Responsibility and Cost Centre Classification

Each EDP centre should establish its own appropriate responsibility and cost centres. The code used with this classification should be designed to meet centre and departmental needs.

A sample responsibility code is shown in the boxes of the organization chart at the beginning of Part I. Each box has a unique code, and the first digit of the code permits grouping the units responsible to each assistant director. In this example the number of units is sufficiently small that a one digit code could also be used.

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4. EDP Services Classification

The basic EDP Services classification is presented in Appendix VII-2. The following notes are designed to clarify the meaning of its groups and classes. All costs and all revenues should be coded by this classification.

Code	Title and Comments
1.	<i>Computer and Related Services</i> — this group includes all machine based services provided by an EDP centre, including any scheduling, expediting and work verification services, and also the administrative support work directly related to these services.
1.09	<i>Computer processing</i> — this class includes all computer services (single stream batch, multiprogrammed batch and interactive) including terminal services and plotting services. It will also include any communications necessary to link computers and terminals, and such support services as the tape and disk library. Its costs include the costs of system software implementation and maintenance and, where necessary, development.
1.40	<i>Document reading</i> — this class includes all forms of on-line or off-line document reading, including mark-sense, magnetic ink character recognition (MICR), and optical character recognition (OCR). The costs of on-line document reading should include any costs of CPU time and other computer processing used to support the document reader (this EDP service should be billed as a customer of EDP service 1.09).
1.43	<i>COM services</i> (computer output to microfilm) — this class includes all forms of on-line or off-line COM operation, including any film development and reproduction services provided by the centre. As with EDP service 1.40, its costs should include any costs of CPU time and other computer processing used in its support.
1.46	<i>Auxiliary and unit record services</i> — this class includes the sorting, collation, tabulation and reproduction of punched cards on unit record machines, and the bursting, booking, binding and reproduction of paper output from computers or unit record machines.
1.50	<i>Data preparation services</i> — this class includes key punching, key to tape or disk, paper tape punching and OCR typing. Any computer time, etc. used to support this service should be billed to it as a cost (cf. 1.40, 1.43).
1.59	<i>Computer and related services n.e.s.</i> (not elsewhere specified) — this class includes the costs of administration of the Computer and Related Services group, and also the overall control of work flows through the individual services. In some centres this class may include data control and verification, but these functions will more often be associated with the specific EDP service classes listed above.

5. *Systems and Programming Services* — this group includes all forms of computer applications systems analysis and programming. It includes the development of user and programmer utilities, as well as specific applications software, but does not include computer operating systems programming and maintenance (systems software: 1.09).
- 5.60 *Systems services* — this class includes project initiation and planning services (including problem definition and feasibility studies), project analysis and design, project implementation (including necessary operational training for user staffs), project audit, and general project advisory services.
- 5.70 *Programming services* — this class includes application and utility program design, coding, testing and documentation, and program optimization and maintenance.
- 5.79 *Systems and programming services n.e.s.* — this class includes those costs (chiefly administrative) of the systems and programming services group which can not be associated with a specific project or service.
9. *Other EDP Services* — this group includes the general management of the EDP centre, training and brokerage services (where applicable), and the provision of support services to other EDP activities.
- 9.91 *Training services* — this class includes the training of the centre's own staff as well as customer training not specifically connected with individual projects (see 5.60).
- 9.95 *Brokerage services* — this class includes the provision of external EDP services to customers, including assistance in service selection, arrangements for customer training, verification of invoices, etc.
- 9.99 *EDP services n.e.s.* — this class includes those elements of the management and planning of the EDP centre which do not relate specifically to another service class or group, and such central support services as pick-up and delivery, reception, accounting, stenography and filing, as well as any unspecified services provided to customers.

Each of the above classes should be charged with all costs directly associated with the service (including salaries and fringe benefits, equipment costs, accommodation costs and supplies), and should be credited with all revenues deriving from the service. Whether overheads (centre management, departmental services, general government services) are regularly or occasionally assigned to each class is for departments and their centres to decide; this will depend on whether periodic service reports are desired on a profit/loss basis or a contribution basis. Examples of both types of report are included in Part I.

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The service classes listed above can readily be divided into additional service elements by any EDP centre that requires more detail. For example, a computer centre operating two distinct configurations, one supplying batch multiprogramming service and the other interactive computing, might substitute for 1.09:

- 1.01 Processor and memory service, system one
- 1.02 Direct access device service, system one
- 1.03 Tape drive service, system one
- 1.04 Printer service, system one
- 1.05 Other services, system one
- 1.16 Interactive computing service, system two
- 1.18 Tape/disk library services (to both)
- 1.19 Other computer and related services.

Together, these eight centre services would add to EDP Service 1.09. Alternatively, they might be coded 1.09.x, and presented as EDP service elements.

There is no requirement that EDP service elements be distinguished by any EDP centre. The use of EDP service elements will depend on the needs of the centre for information and the nature of the departmental coding system with which it must be integrated.

5. EDP Expenses and Revenue Classification

The basic EDP Expenses and Revenue classification is presented in Appendix VII-2. Data for these classes will usually be derived from more detailed coding by line objects. Table 2 presents *examples* of the line objects an EDP centre might use for management information and to meet Government of Canada Accounting requirements. It is intended to help define the EDP Expenses and Revenue classes but is not exhaustive.

Except when an EDP Expense class would relate entirely to costs not covered in government cash accounting (largely imputed costs), Table 2 shows the appropriate Economic Object (EO) codes as given in Administration Improvement Policy MI-8-66, amended July 1969. Economic Object codes are not shown for the revenue-comprising line objects. These will normally correspond to Economic Objects 1493-1497. The economic breakdown of revenues can best be obtained from an off-line analysis by customer undertaken once a year or as required. Neither imputed nor accrued costs or revenues need be reported by Economic Object; the economic analyses pertain only to "cash" transactions.

When an EDP centre is deriving its financial data from departmental line objects, these will usually be adequate to provide any data on Economic Objects of Expenditure required by MI-8-66 and by the Guide on Financial Management. When a centre is establishing its own accounting system, care must be taken to establish sufficient line objects to provide information on any significant Economic Object as well as on each EDP Expenses and Revenue class.

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The line objects for the EDP centre should, if possible, be merged with those of its host department with the latter creating additional departmental line objects as required. The EDP line object numbers shown are illustrative only and departmental line object numbers should usually be substituted. Departments may also use departmental numbers for coding EDP Expenses and Revenue classes if desired.

The examples for EDP Expense class 48 show five line objects (4801, 4811, 4821, 4831, and 4841) which would be used primarily for cash accounting. EDP full cost expense accounts would not show these purchase costs (except as contributors to balance sheet class 31 — see section 7) but would instead use line object 4865 (which might be subdivided to any extent desired). Line object 4869 would be used annually (or as required) to extract the depreciation from line object 4865 for balance sheet class 41. A similar presentation could have been shown for Expense class 15.

In the case of EDP revenue class 90, the listing includes many more accounts than any centre would normally require, and includes some mutually incompatible accounts. This group of possible line objects was based on the components of a number of different systems of charging for computer resources, and elements of different systems have been retained to illustrate alternatives available in algorithm design.

The Expenses and Revenue classification will provide both gross and net totals. Gross expenses for any service unit and for the centre as a whole include the market value of any centre services consumed by centre units (classes 02-89 inclusive). Net expenses exclude the value of own services consumed (class 89). Gross revenue will usually be most usefully stated as the sum of revenue classes 90 and 94 less credits and reruns, while net revenue also deducts the value of centre use of centre services. Both gross and net totals should be available for each EDP service class and for the centre as a whole as guides to management decisions. Only the difference between net revenue and net expenses for the centre is carried forward to balance sheet class 81 (if gross revenue is defined as suggested above, then the difference between centre revenues and expenses will be the same on a gross or net basis).

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TABLE 2. EXAMPLES OF POSSIBLE LINE OBJECTS WITHIN EDP EXPENSES AND REVENUE CLASSES

Possible Line Objects			Possible Line Objects																																																																													
Code	Description	E.O.	Code	Description	E.O.																																																																											
EDP Expenses Class 02—Salaries																																																																																
0201	Civilian regular time — continuing employment	0101	0203	Civilian overtime	0105																																																																											
0202	Civilian regular time — part-time, seasonal and casuals	0102	0204	Civilian retroactive	0110																																																																											
			0205	Military regular time	0115																																																																											
			0206	Military retroactive	0116																																																																											
05—Employee Benefits																																																																																
0501	Civilian allowances and benefits	0120	0521	Employer contributions to unemployment insurance	0139																																																																											
0505	Military allowances and benefits	0121	0522	Employer contributions to Canada Pension Plan	0142																																																																											
0511	Employer contribution PSSA	0130	0523	Employer contributions to other pension programs	0143																																																																											
0512	Employer contribution Public Service Death Benefit Acct.	0132	0524	Employer contributions to hospital and medical plans	0144																																																																											
0515	Employer contribution — Permanent Forces Pension Fund	0134	0529	Employer contributions, other	0133																																																																											
0516	Employer contribution — Death Benefit, Military	0136	0539	Supplementary labour income, civilian allowances, rations, and free food, lodging, etc.	0145																																																																											
0517	Employer contribution — other social security and pension funds, military	0138	0599	Other supplementary personnel costs	0146																																																																											
08—Consultants and Contract Staff																																																																																
0801	Management consulting services	0471	0803	Programming services	0472																																																																											
0802	Systems design services	0471	0804	Overload staff services	0478																																																																											
			0809	Other consulting services	0471																																																																											
12—Production Equipment Rental — Actual																																																																																
<table> <tr> <td>External rentals</td> <td></td> <td>1240</td> <td>— mark sense readers</td> <td>0509</td> </tr> <tr> <td>— processor and memory</td> <td>0509</td> <td>1241</td> <td>— OCR devices</td> <td>0509</td> </tr> <tr> <td>— channels</td> <td>0509</td> <td>1242</td> <td>— MICR devices</td> <td>0509</td> </tr> <tr> <td>— drums</td> <td>0509</td> <td>1243</td> <td>— COM equipment</td> <td>0509</td> </tr> <tr> <td>— disk drives</td> <td>0509</td> <td>1244</td> <td>— bursting, decollating</td> <td>0510</td> </tr> <tr> <td>— other direct access devices</td> <td>0509</td> <td>1245</td> <td>— binding</td> <td>0510</td> </tr> <tr> <td>— tape devices</td> <td>0509</td> <td>1246</td> <td>— copying</td> <td>0510</td> </tr> <tr> <td>— card readers</td> <td>0509</td> <td>1247</td> <td>— unit record</td> <td>0509</td> </tr> <tr> <td>— paper tape devices</td> <td>0509</td> <td>1248</td> <td>— other auxiliary equipment</td> <td>0509</td> </tr> <tr> <td>— card punch devices</td> <td>0509</td> <td>1250</td> <td>— key punches/verifiers</td> <td>0510</td> </tr> <tr> <td>— plotters</td> <td>0509</td> <td>1251</td> <td>— key tape</td> <td>0509</td> </tr> <tr> <td>— line printers</td> <td>0509</td> <td>1252</td> <td>— key disk</td> <td>0509</td> </tr> <tr> <td>— high speed terminals</td> <td>0509</td> <td>1253</td> <td>— OCR typewriter</td> <td>0509</td> </tr> <tr> <td>— key driven terminals</td> <td>0509</td> <td>1259</td> <td>— other production equipment</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>0509</td> </tr> </table>						External rentals		1240	— mark sense readers	0509	— processor and memory	0509	1241	— OCR devices	0509	— channels	0509	1242	— MICR devices	0509	— drums	0509	1243	— COM equipment	0509	— disk drives	0509	1244	— bursting, decollating	0510	— other direct access devices	0509	1245	— binding	0510	— tape devices	0509	1246	— copying	0510	— card readers	0509	1247	— unit record	0509	— paper tape devices	0509	1248	— other auxiliary equipment	0509	— card punch devices	0509	1250	— key punches/verifiers	0510	— plotters	0509	1251	— key tape	0509	— line printers	0509	1252	— key disk	0509	— high speed terminals	0509	1253	— OCR typewriter	0509	— key driven terminals	0509	1259	— other production equipment						0509
External rentals		1240	— mark sense readers	0509																																																																												
— processor and memory	0509	1241	— OCR devices	0509																																																																												
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				0509																																																																												

APPENDIX VII-3

TABLE 2. EXAMPLES OF POSSIBLE LINE OBJECTS WITHIN EDP EXPENSES AND REVENUE CLASSES — cont.

Possible Line Objects			Possible Line Objects		
Code	Description	E.O.	Code	Description	E.O.
EDP Expense Class 15—Production Equipment Rental — Imputed*					
line object detail could be as for EC 12					
18—Production Equipment Maintenance					
line object detail could be as for EC 12, or might be summarized:					
1809	Computer equipment maintenance	0667	1846	Auxiliary equipment maintenance	0667
1840	Document reader maintenance	0667	1850	Data prep. equip. maintenance	0667
1843	COM equipment maintenance	0667	1859	Other equipment maintenance	0667
21—Data Transmission Costs					
2101	Telephone service (data)	0220	Equipment rentals, imputed		
2102	Telegraph and radio service	0221	2123	— modems	—
	Equipment rentals, actual		2125	— multiplexors	—
2113	— modems	0906	2127	— concentrators	—
2115	— multiplexors	0906	2129	— other	—
2117	— concentrators	0906	2150	Equipment maintenance	0655
2119	— other	0906			
24—External Facilities					
2401	Computer processing — external (separate line objects could be opened for each service bureau or type of service)	0472	2403	COM services — external	0472
			2404	Auxiliary and unit record services — external	0472
			2405	Data preparation — external	0472
2402	Document reading — external	0472	2409	Other EDP equipment services — external	0472
27—Software Acquisition					
2701	Software rentals	0512	2703	Software amortization	—
2702	Software purchase	0472			
39—Production Supplies					
3901	Production supplies — punch cards	0762	3903	Production supplies — disks	0780
3902	Production supplies — tapes	0780	3904	Production supplies — paper	0762
			3905	Production supplies — other	0762
44—Accommodation					
4401	Accommodation rental	0502	4403	Leasehold improvements — amortization	—
4402	Accommodation repairs and upkeep	0629	4404	Utilities	0701

*See also text of Section F.5.

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APPENDIX VII-3

TABLE 2. EXAMPLES OF POSSIBLE LINE OBJECTS WITHIN EDP EXPENSES AND REVENUE CLASSES — cont.

Possible Line Objects			Possible Line Objects		
Code	Description	E.O.	Code	Description	E.O.
EDP Expense Class 48—Office Furniture and Equipment					
	Office machines			Other equipment n.e.s.	
4801	— equipment*	0917	4831	— equipment*	0916
4802	— supplies	0750	4832	— supplies	0789
4803	— purchased repairs	0666	4833	— purchased repairs	0665
	Air conditioning			Office furniture and fixtures	
4811	— equipment*	0907	4841	— equipment*	0915
4812	— supplies	0781	4843	— purchased repairs	0664
4813	— purchased repairs	0656	4855	Motor vehicle rental, actual	0508
	Alarms and safety		4856	Equipment rental, actual	
4821	— equipment*	0913		n.e.s.	0511
4822	— supplies	0787	4865	Equipment rental, imputed	—
4823	— purchased repairs	0662	4869	Office furniture and equipment amortization	—
52—Travel					
5201	Travel, removal — public servants	0201	5202	Travel, removal — other	0202
			5203	Conference attendance	0201
55—Printing and Stationery					
5501	Printing, stationery and office supplies	0762	5502	Departmental publications	0310
58—Telephone and Telegraph					
5801	Telephone service (except data communications)	0220	5803	Other communications services (except data)	0222
5802	Telegraph, cable and wireless (except data)	0221			
61—Interest					
6101	Interest on working capital — imputed	—			
69—Other Expenses					
6901	Association memberships	0478	6909	Laundry, dry cleaning and related services	0470
6902	Postage (except parcel post)	0212		Other business services	0478
6903	Parcel post	0211	6910	Storage and warehousing	0479
6904	Pick-up and delivery	0210	6911	Contracted building cleaning	0480
6905	Other freight	0210	6912	Purchased publications	0761
6906	Recruitment advertising	0301	6913	Training of public servants	
6907	Legal services	0410	6914	— other	0442
6908	Protection services	0460			

*See text of Section F.5.

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TABLE 2. EXAMPLES OF POSSIBLE LINE OBJECTS WITHIN EDP EXPENSES AND REVENUE CLASSES — cont.

Possible Line Objects			Possible Line Objects		
Code	Description	E.O.	Code	Description	E.O.
EDP Expense Class 72—Departmental Costs					
7201	Financial services	—	7204	Other departmental services	—
7202	Personnel services	—	7205	Departmental general management	—
7203	Stenography and typing	—			
75—Government Costs					
7501	Payroll services	—	7504	Personnel management	—
7502	Accounts payable services	—	7506	Insurance	—
7503	Staffing and appeals	—	7509	Other government costs	—
78—Language Training (deduct)					
7801	Salary credits	—	7804	Travel credits	—
7802	Professional services credits	—	7805	Other credits	—
7803	Materials credits	—			
89—Internal Charges					
8901	Computer processing	—	8905	Systems services	—
8902	Data preparation	—	8906	Programming services	—
8903	Other equipment services	—	8907	Training services	—
8904	Systems software services	—	8909	Centre general management	—
EDP Revenue Class 90—Revenue from Users					
9001	Processor	—	9020	Other direct access devices	—
	— CPU activity	—	9021	Tape devices	—
9002	— core occupation	—	9022	Card readers — card reading	—
9003	— virtual pages occupied	—	9023	Card readers — other	—
9004	— time slices used	—	9024	Paper tape devices — reading	—
9005	— other	—	9025	— punching	—
9006	Channel devices	—	9026	— other	—
	— unit record traffic	—	9027	Card punch devices	—
9007	— drum traffic	—	9028	— card punching	—
9008	— disk traffic	—	9029	— other	—
9009	— tape traffic	—	9030	Plotting devices — plotting	—
9010	— other	—	9031	Plotting devices — other	—
9011	Drum devices	—	9032	Line printing devices	—
	— on-line	—	9033	— printing	—
9012	— access	—	9034	— other	—
9013	— data traffic	—	9035	Terminal devices — high speed	—
9014	— other	—	9036	— reading	—
9015	Disk devices	—	9037	— printing	—
	— on-line	—	9038	— data traffic	—
9016	— public	—	9039	— connect time	—
9017	— access	—	9040	— equipment lease	—
9018	— data traffic	—	9041	— other	—
9019	— other	—			

APPENDIX VII-3

TABLE 2. EXAMPLES OF POSSIBLE LINE OBJECTS WITHIN EDP EXPENSES AND REVENUE CLASSES — conc.

Possible Line Objects			Possible Line Objects		
Code	Description	E.O.	Code	Description	E.O.
EDP Revenue Class 90—Revenue from Users — conc.					
	Terminal devices — key driven	—	9066	OCR devices — reading	—
9039	— connect time	—	9067	OCR devices — other	—
9040	— equipment lease	—		Magnetic character devices	—
9041	— other	—	9068	— reading	—
	Communications devices	—	9069	— printing	—
9042	— line charges	—	9070	— other	—
	— interface equipment	—	9071	COM devices	—
9043	— terminal end	—	9072	Film processing	—
9044	— computer end	—	9073	Bursting and decollating	—
	Operator activity	—	9074	Binding	—
9045	— tape mount	—	9075	Copying	—
9046	— disk mount	—	9076	Unit record	—
9047	— printer	—	9077	Calculating	—
9048	— reader	—	9078	Other auxiliary machines	—
9049	— card punch	—	9079	Key punching	—
9050	— plotter	—	9080	Key to tape/disk	—
9051	— console	—	9081	OCR typing	—
9052	— dedicated	—	9082	Other data preparation	—
9053	— other	—	9083	Data and production control	—
9054	Paper	—	9084	Project initiation/planning	—
9055	Cards	—	9085	Project analysis and design	—
9056	Tape rentals	—	9086	Project implementation	—
9057	Tape sales	—	9087	General advisory services	—
9058	Disk rentals	—	9088	Development programming	—
9059	Disk sales	—	9089	Maintenance programming	—
9060	Storage of cards	—	9090	Training	—
9061	Storage of tapes	—		Brokerage (gross)	—
9062	Storage of disks	—	9091	— machine related	—
9063	Systems software service	—	9092	— systems/programming	—
	Mark sensing devices	—	9093	Pick-up and delivery	—
9064	— reading	—	9094	Other support services	—
9065	— other	—	9099	Other revenues from users	—
94—Appropriations and Other Revenues					
9401	Appropriations	—	9404	Refunds of prior year's expenditures	—
9402	Subsidies	—	9405	Non-EDP revenues	—
9403	Gains or losses on sale of assets	—	9409	Other revenues	—
98—Credits and Unbilled Charges (deduct)					
9801	Credits to users*	—	9803	Internal charges	—
9802	Reruns*	—			

*In practice, this object might be established as a separate class with the same detail as class 90.

6. Cross-Classification by EDP Services and EDP Expenses and Revenue

Much of the financial information required for EDP centre management and the overall planning of EDP will derive from the cross-classification of accounting data by EDP Services and EDP Expenses and Revenue (or by EDP cost centre and EDP Expenses and Revenue). A review of Chart I will indicate how cross-classification increases the significant detail available beyond the confines of any single classification (cost centres could be added in the third dimension).

The chart also indicates that every EDP expense or revenue class need not be coded to every EDP service. Generally, the direct costs associated with any EDP service should be coded to the EDP service as well as to the EDP expense or revenue class. However for "overhead" items such as interest on working capital, departmental costs and government costs, and for minor expense items such as travel and stationery, coding to the n.e.s. service classes will usually be adequate. In smaller centres it may be sufficient to code such costs to EDP Service 99.

7. EDP Centre Balance Sheet

In addition to regular monthly or periodic financial reports, the EDP full cost accounting system should provide for at least an annual balance sheet showing the nature and value of assets and liabilities. Information for balance sheet preparation can be captured either by recoding the regular accounts or by adding a balance sheet code when processing the basic transaction documents and other data.

Table 3 provides a listing of the sort of items that might be required on a balance sheet, and a set of codes which might be used to capture the required information. The extent of detail that might be required in any particular case will depend on circumstances; a balance sheet should not show items of negligible importance, nor omit items of real significance in understanding the results of operations over the year.

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TABLE 3. SAMPLE EDP CENTRE BALANCE SHEET CODES

ASSETS

Current Assets

- 10 Petty cash
- 11 Cash on deposit with Receiver General
- 20 Accounts receivable
- 21 Prepaid charges
- 22 Employee travel advances
- 23 Inventories
- 24 Work in progress (unbilled but earned)

Sundry Assets

- 29 Purchase credits

Fixed Assets and Depreciation

- 30 Fixed Assets — Production equipment
 - Office equipment and furnishings
 - Tapes and disks (if capitalized)
 - Software (if capitalized)
- 40 Accumulated Depreciation — Production equipment
 - Office equipment and furnishings
 - Tapes and disks (if capitalized)
 - Software (if capitalized)

LIABILITIES AND EQUITY

Current Liabilities

- 50 Accounts payable
- 51 Accrued charges
- 52 Common services accruals
- 53 Receiver General

Contra Account

- 59 Purchase credits (this balances item 29)

Capital Accounts

- 70 Advances from Department of Finance
 - 75 Assets financed from appropriations
 - 80 Revolving Fund (or Vote Netting Fund, or Appropriation Fund)
 - 81 Earned surplus/deficit
-

Possible Departmental Expenses and Revenue Control Accounts

- 91 Payroll Control
- 92 Fringe benefit control
- 93 Equipment rental control
- 94 Other expenses control
- 95 Common services control
- 96 Revenue control

NOTE: These accounts would usually be closed out to a nil balance at the end of the year, and therefore would not appear on the Balance Sheet. They are examples of the sort of accounts that might be necessary for linkage to the department's books.

**CHART I: RELATIONSHIP BETWEEN THE CLASSIFICATIONS OF EDP SERVICES
AND EDP EXPENSES AND REVENUE**

EDP EXPENSES AND REVENUE CLASS	EDP SERVICES CLASS												
	COMPUTER PROCESSING	DOCUMENT READING	COM SERVICES	AUXILIARY AND UNIT SERVICES	RECORD SERVICES	DATA PREPARATION	COMPUTER AND RELATED AND SERVICES N.E.S.	SYSTEMS SERVICES	PROGRAMMING SERVICES	SYSTEMS & PROG. SERVICES N.E.S.	TRAINING SERVICES	BROKERAGE SERVICES	EDP SERVICES N.E.S.
Salaries	X	X	X	X	X	X		X	X	X	X	X	X
Employee Benefits	X	X	X	X	X	X		X	X	X	X	X	X
Consultants and Contract Staff	X	X	X	X	X	X		X	X	X	X	X	X
Production Equipment Rental—Actual	X	X	X	X	X						X		X
Production Equipment Rental—Imputed	X	X	X	X	X						X		X
Production Equipment Maintenance	X	X	X	X	X						X		X
Data Transmission Costs	X												
External Facilities	X			X	X	X		X	X	X	X	X	X
Software Acquisition	X	X	X			X		X	X		X		X
Production Supplies	X		X		X								
Accommodation Office Furniture and Equipment	X	X	X				X		X		X		X
Travel						X			X				X
Printing and Stationery						X			X				X
Telephone and Telegraph						X			X				X
Interest						X			X				X
Other Expenses						X			X		X		X
Departmental Costs						X			X				X
Government Costs						X			X				X
Language Training (Deduct)						X			X				X
Internal Charges	X			X	X	X		X	X	X	X	X	X
Revenue from Users	X	X	X	X	X	X		X	X	X	X	X	X
Appropriations and Other Revenues													
Credits and Unbilled Charges (Deduct)	X	X	X	X	X			X	X		X	X	

NOTE: Only the basic classes are shown on the chart. Other classes may be added at each centre's option.

G. METHODS OF SYSTEMS INTEGRATION AND LINKAGE

There are three ways in which an EDP centre's accounting system can be operated:

- as part of the accounting system of the host department with the addition of certain memorandum accounts,
- independent of the accounting system of the host department but still using the DSS-Services accounting and payroll reports as primary sources of data, with reconciliation to departmental cash controls,
- independent of the accounting system of the host department with direct entry from source documents for payroll, equipment and expenses, and with reconciliation to departmental cash controls.

EDP centres, in consultation with their custodian department, should choose that alternative which best meets the centre's financial information needs at a reasonable cost. Each alternative is consistent with the requirements of the "Guide on Financial Administration", which states "All financial and financially related systems of a department shall be integrated with each other and with the central accounting system of the government to avoid duplication of accounting effort and to ensure the completeness and consistency of all data reported."¹ The principal advantages and disadvantages associated with each choice are indicated below, and the required bookkeeping entries are outlined in Table 4.

1. Using Custodian Department Accounting System**Advantages**

- a. There would be no reconciliations between centre and department books.
- b. An integrated accounting system may be less expensive to operate than a subsidiary accounting system — especially for smaller EDP centres.

Disadvantages

- a. The departmental coding system may have to be redesigned to meet centre coding requirements.
- b. Departmental account coding staff may not be sufficiently familiar with EDP full cost accounting requirements, causing errors in centre records.
- c. Reports generated by the departmental system would require adjustments for memorandum entries, which might cause errors.
- d. Reports generated by the departmental system may not be timely or frequent enough for centre management.

1. op. cit., Part II, p. 8.1.

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2. Using Subsidiary System with Inputs from DSS-Services

Advantages

- a. Difficulties in reconciling centre and departmental books should be minimized, to the extent that the information entered in both systems uses the same accounting codes.
- b. Centre account classifications could be independent of the departmental coding system, enabling changes to centre codes as required and avoiding any redesign of departmental coding systems.
- c. Separate coding of centre accounts should minimize errors.
- d. Entries for non-cash items or reallocations would be automatic and their omission improbable.

Disadvantages

- a. Reports would be dependent upon DSS-Services accounting and payroll data and may not be timely or frequent enough for centre management.
- b. Regular reconciliation between centre and departmental control accounts would be required.

3. Using Subsidiary System with Direct Data Entry

Advantages

- a. Regular financial reports could be available within days after the end of the reporting period enabling prompt remedial or other action where required.
- b. Special reports on any area of the centre's operation could be prepared on demand with a minimum of delay, which might reduce requirements for regular reports.
- c. Centre account classifications could be independent of the departmental coding system, enabling changes to centre codes as required and avoiding any redesign of departmental coding systems.
- d. Financial reports should be more accurate because cost allocation is from original rather than secondary sources.
- e. Separate coding of centre accounts should minimize errors.
- f. Entries for non-cash items or reallocations would be automatic and their omission improbable.

Disadvantages

- a. There is some danger of duplication of effort by the centre, the department and DSS-Services.

- b. Regular reconciliations between centre and departmental control accounts would be required.

When a subsidiary accounting system is selected, the financial officer responsible for the subsidiary system should if possible be located in the centre. This will secure the additional benefit of increased and better informed financial advice and guidance to centre management.

Table 4, which follows, illustrates a method of recording the entries required in the accounts of an EDP centre and its custodian department. The entries are shown both for an operation financed through annual appropriations and for one financed through a revolving fund. If a centre is financed through an appropriation that provides for vote netting, only minor modification to the appropriation example would be required. The source data for this system could be derived from primary sources as transactions are processed through the departmental accounting system or extracted from reports provided after the fact by DSS.

The table consists of five parts. Part I lists the basic assumptions and data used. Part II presents the entries required for each type of transaction, and for periodic clearing of "housekeeping" accounts. Part III lists the simplified set of EDP centre accounts required by the example, and shows the entries which would appear in each to conform with Part II. Part IV summarizes the balances remaining in the accounts at the end of the assumed accounting period (1 year), while Part V summarizes the transactions which would appear on the custodian department's books.

The example shows that the method of financing chosen will affect some bookkeeping details but will not affect the net financial results of the centre's operations (i.e., profit or loss for the period). Revolving fund financing requires actual payment of some costs which are only imputed with appropriations financing (see Treasury Board Circular 1970-7), and these will affect the totals shown on the department's books. These additional "payments" by the custodian department are offset by "revenues" recorded by other departments so that there is no actual effect on the total cost of government operations.

Persons unfamiliar with accounting conventions may find the following points helpful when studying Table 4.

- In double entry bookkeeping, every transaction must be represented by one or more debit entries and one or more credit entries in such a manner that the total of the debit entries equals the total of the credit entries. "Debits" and "credits" are defined as follows by the Canadian Institute of Chartered Accountants:

Debit (Dr.): an entry recording the creation of or addition to an asset, the incurring of an expense, or the reduction or elimination of a liability, owners' equity or revenue;

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Credit (Cr.): an entry recording the creation of or addition to a liability, or owners' equity, or revenue, or the reduction or elimination of an asset or expense.

- It is customary when presenting accounting examples of the pattern used in Part II, to show the debit side of the entry before the credit side of the entry, even if the credit logically precedes or results in the debit.
- It is customary when listing accounts as in Part III or summarizing them as in Part IV to show asset and liability accounts ahead of expense and revenue accounts.

**TABLE 4. ACCOUNTING ENTRIES AND LINKAGE BETWEEN EDP CENTRE
ACCOUNTS AND DEPARTMENTAL ACCOUNTS**

I. ASSUMPTIONS

This example assumes a multi-service EDP Centre at the end of its first year of operations, with the following simplified capital, expenses and revenue transactions for the year. The centre's books may be a sub-set of the department's books or may be independent but linked to the main departmental system through control accounts to ensure agreement between the two.

A. Capital Transactions		\$'000	
1.	Depreciated value of fixed assets provided to centre when established	500	
2.	Assets purchased, April 30, CY, and financed by capital vote (appropriations case) or loan vote (revolving fund case)	200	
B. Expense Transactions			
3.	Direct expenses		
(a)	Salaries	1,000	
(b)	Consultants and contract staff	90	
(c)	Production equipment rental — actual	800	
(d)	Other (supplies, etc.)	110	2,000
4.	Imputed rentals		
(a)	Depreciation element	145*	
	— fixed assets received when established		
	— fixed assets acquired in CY	30*	
(b)	Interest element		
	— fixed assets received when established	35*	
	— fixed assets acquired in CY		
	— fixed assets acquired in CY	15*	225
5.	Common services		
(a)	Departmental costs	100*	
(b)	Government costs (including accommodation)	125*	
(c)	Employee fringe benefits	150*	375
6.	Interest on working capital (rate $\times 1/4$ of $(3 + 5 + 8 - 7)$)		40*
7.	Official language training credit		- 55
8.	Internal charges		
	FULL EDP COST		2,875
C. Revenue Transactions			
9.	Gross revenue, including reruns		
(a)	from other departments	300	
(b)	from own department	2,500	
(c)	internal charges	290	3,090
10.	Deductions from gross revenue		
(a)	reruns — other departments	25	
(b)	reruns — own department	160	185
	NET EDP REVENUE		2,905
	NET INCOME (REVENUE - COST)		30

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*These would be imputed costs for a centre financed by appropriations, but would usually be real costs for a centre operating with a revolving fund.

TABLE 4. ACCOUNTING ENTRIES AND LINKAGE BETWEEN EDP CENTRE ACCOUNTS AND DEPARTMENTAL ACCOUNTS – CONT.

II. ILLUSTRATIVE ENTRIES, BY TYPE OF TRANSACTION (transaction numbers correspond to Part I)

This example assumes the simplified set of accounts which is shown in Part III. In practice, centres would use the full EDP Expenses and Revenue classification, plus line object detail as required. Entries in the centre's books are shown as Dr. or Cr., those in the department's books are without prefix.

The example does not include accrual entries of the type needed to ensure that costs and revenues are reported in the appropriate accounting period. These would usually be simple entries:

Dr. Expense (or Cr. Revenue)

Cr. Accrued charges control (or Dr. Accrued revenues control).

These entries would be reversed at the beginning of the next accounting period.

The examples assume double entry bookkeeping by the centre, and single entries by the department (except as noted).

Transaction and Accounts Used	Appropriations Basis			Revolving Fund Basis			Notes
	Centre	Dept.*	Dept.*	Centre	Dept.*	Dept.*	
	Dr.	Cr.	Dr.	Cr.	Cr.	\$'000	
1. Fixed Assets Received							
Dr. Fixed assets, by type	500	500	no entry	500	500	no entry	
Cr. Equity in fixed assets							
2. Fixed Assets Purchased							
Dr. Fixed assets, by type	200	200	200	200	200	200	
Cr. Equity in fixed assets							
Capital vote, fixed assets							
OR							
Cr. Loan from Finance				200	200	200	
Loan vote (loan to centre)							
3. Direct Expenses							
Dr. Direct expenses – salaries	1,000			1,000			
Dr. Direct expenses – consultants	90	90					
Dr. Direct exp. – prod. eq. rentals	800			800			
Dr. Direct expenses – other	110			110			
Cr. Departmental centre control				2,000			
Operating cost vote					2,000		
OR							
Cr. Revolving fund advance					2,000	no entry	
4. Imputed Rentals							
Dr. Prod. equip. rental – imputed	225			225			
Cr. Imputed expenses control					225	no entry	
a. Depreciation (appropriations)							
Dr. Equity in fixed assets	145						
Dr. Equity in fixed assets	30	30	no entry				
Cr. Accumulated depreciation							
Depreciation (revolving fund)							
Dr. Equity in fixed assets							
Cr. Revolving fund advances							
Refund of prior year expenses							
Dr. Loan from Finance							
Cr. Revolving fund advance							
Repayment of loan for centre							
Dr. Imputed expenses control							
Cr. Accumulated depreciation							
4b. Interest Included in Imputed Rentals							
Dr. Imputed expenses control	50						
Cr. Revolving fund advance							
Interest on fixed assets							35
Interest on loan for centre							15

*The department's books are on an Appropriations basis.

**TABLE 4. ACCOUNTING ENTRIES AND LINKAGE BETWEEN EDP CENTRE
ACCOUNTS AND DEPARTMENTAL ACCOUNTS – CONT.**

Transactions and Accounts Used	Appropriations Basis				Revolving Fund Basis				Notes
	Central Dr.	Dept. Cr.	Dr.	Cr.	Centre Dr.	Dept. Cr.	Dr.	Cr.	
	\$'000				\$'000				
5. Common Services									
Dr: Common services – dept. costs	100				100				– These expenses are recorded only with an expense class (not line object) and EDP service. The contra is either a control account (assuming no cash transaction) or a liability account (revolving funds usually require payment of these costs).
Dr: Common services – govt. costs	125				125				
Dr: Common services – employee benefits.	150				150				
Cr: Common services: control OR									
Cr: Due to Receiver General									
6. Interest on Working Capital									– Only interest on working capital belongs in EDP Expenses class 61.
Dr: Interest on working capital	40				40				– With a revolving fund, the interest actually charged on the RF advance would be used.
Cr: Imputed expenses control OR									
Cr: Revolving fund advance									
7. Official Languages Training									– With appropriation financing this is a negative imputed expense.
Dr: Imputed expenses control OR	55				55				– For the revolving fund it is assumed that the centre is reimbursed for costs included in items 3 and 5 above.
Dr: Revolving fund advance									
Cr: Language training credit									
8. Revenue									– EDP services provided are recorded as a credit to revenue and a debit to accounts receivable with detail by project, user and EDP services class. The entries in practice shown are composite entries; entries shown are composite entries, which reduces R/F-A. No contra on dept. books.
9 & 10. Dr: Due from other depts.	275				275				– Appropriations: the host dept. receives payments for work done by centre for others, and credits it as non-tax revenue.
Dr: Due from own dept.	2,340				2,340				– The centre's books offset this against centre expenses paid by dept.
Dr: Allowances and reruns	185				185				– RF : payment is collected by the centre and used to reduce the working capital advance.
Dr: Internal charges	290				290				
Cr: Gross revenue	3,090				3,090				
11. Settlement of Accounts									– Appropriations: the centre's books offset charges to dept. against centre expenses paid by dept. The dept. treats EDP services as internally generated, using a contra clearing account to eliminate effects on budgetary position.
a. With other departments									– RF : dept. pay-centre for services, which reduces R/F-A. No contra on dept. books.
Dr: Department – centre control OR	275				275				– Appropriations: the common services and imputed expenses control account balances are offset against transferred amounts – centre control.
Dr: Revolving fund advance									– The profit of the centre is credited to the dept. and shown as an adjustment to the total charge for EDP services, to adjust services pricing to cost.
Cr: Due from other depts.									– RF : payment to common services are made to each dept. via custodian recoveries \$100,000.
Non-tax revenue									– These entries reflect the transfer of profit to the dept. They assume that the operating accounts of the centre have been closed to the Profit/Loss account.
b. With own department									
Dr: Department – centre control OR	2,340				2,340				
Dr: Revolving fund advance									
Cr: Due from own dept.									
EDP services received									
Due to centre (contra account)									
c. Common services/Imputed expenses									
Dr: Common services: control	375				375				– The department's books are on an Appropriations basis.
Dr: Imputed expenses: control	210				210				– Use of this account assumes that other accounts have already been closed to Profit/Loss. The closing entries which would precede this transfer are omitted to simplify this example.
Dr: Department – centre control	585				585				
Dr: Profit/Loss*	30				30				
Cr: Due to centre (contra account)									
Cr: EDP services received									
Dr: Due to Receiver General									
Cr: Revolving fund advance									
Recovery of departmental expenses									
Dr: Profit/Loss**									
Cr: Revolving fund advance									
Miscellaneous non-tax revenue									

* The department's books are on an Appropriations basis.

** Use of this account assumes that other accounts have already been closed to Profit/Loss. The closing entries which would precede this transfer are omitted to simplify this example.

TABLE 4. ACCOUNTING ENTRIES AND LINKAGE BETWEEN EDP CENTRE ACCOUNTS AND DEPARTMENTAL ACCOUNTS – cont.**III. ACCOUNTS REQUIRED IN CENTRE BOOKS**

The transactions shown in Part II would require the following list of accounts in the centre's books, and the illustrated entries in each. The account numbering differs from the transaction numbering of Parts I and II.

Account and Entry	Appropriations Basis			Revolving Fund Basis		
	Dr.	Cr.	Bal. \$'000	Dr.	Cr.	Bal. \$'000
A. ASSET AND LIABILITY ACCOUNTS						
1. Fixed assets, by type						
Fixed assets received	500		D 500	500		D 500
Fixed assets purchased	200		D 700	200		D 700
2. Equity in fixed assets						
Fixed assets received		500	C 500		500	C 500
Fixed assets purchased		200	C 700			
Depreciation	145		C 555	145		C 355
Depreciation	30		C 525			
3. Loan from Finance						
Fixed assets purchased		not applicable			200	C 200
Depreciation				30	C 170	
4. Accumulated depreciation						
Depreciation	175	C 175			175	C 175
5. Due from other departments						
Revenue – due from other departments	275		D 275	275		D 275
Settlement – with other departments		275	Ø		275	Ø
6. Due from own department						
Revenue – due from own department	2,340		D 2,340	2,340		D 2,340
Settlement – with own department		2,340	Ø		2,340	Ø

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TABLE 4. ACCOUNTING ENTRIES AND LINKAGE BETWEEN EDP CENTRE ACCOUNTS AND DEPARTMENTAL ACCOUNTS – cont.

Account and Entry	Appropriations Basis			Revolving Fund Basis		
	Dr.	Cr.	Bal. \$'000	Dr.	Cr.	Bal. \$'000
A. ASSET AND LIABILITY ACCOUNTS – conc.						
7. Revolving fund advance				2,000	C 2,000	
Direct expenses				145	C 2,145	
Depreciation			not applicable	30	C 2,175	
Depreciation						
Interest in imputed rentals				50	C 2,225	
Interest on working capital				40	C 2,265	
Official languages training				55	C 2,210	
Settlement – with other departments				275	C 1,935	
Settlement – with own department				2,340	D 405	
Settlement – common services				375	D 30	
Settlement – common services				30	Ø	
8. Department-centre control						
Direct expenses	2,000	C 2,000				
Settlement – with other departments	275	C 1,725		not applicable		
Settlement – with own department	2,340	D 615				
Settlement – common services	585	D 30				
Settlement – common services	30	Ø				
9. Imputed expenses control						
Imputed rentals	225	C 225		225	C 225	
Depreciation				175	C 50	
Interest in imputed rentals				50	Ø	
Interest on working capital	40	C 265				
Official languages training	55	C 210				
Settlement – common services	210	Ø				
10. Common services control						
Common services	375	C 375		not applicable		
Settlement – common services	375	Ø				
OR						
Due to Receiver General						
Common services		not applicable		375	C 375	
Settlement – common services				375	Ø	

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**TABLE 4. ACCOUNTING ENTRIES AND LINKAGE BETWEEN EDP CENTRE
ACCOUNTS AND DEPARTMENTAL ACCOUNTS – cont.**

Account and Entry	Appropriations Basis			Revolving Fund Basis		
	Dr.	Cr.	Bal. \$'000	Dr.	Cr.	Bal. \$'000
B. EXPENSE AND REVENUE ACCOUNTS*						
11. Direct expenses						
Direct expenses – salaries	1,000		D 1,000	1,000		D 1,000
Direct expenses – consultants	90		D 1,090	90		D 1,090
Direct exp. – prod. eq. rentals	800		D 1,890	800		D 1,890
Direct expenses – other	110		D 2,000	110		D 2,000
12. Prod. equip. rentals – imputed						
Imputed rentals	225		D 225	225		D 225
13. Common services						
Common services – dept'l. costs	100		D 100	100		D 100
Common services – govt. costs	125		D 225	125		D 225
Common services – employee ben.	150		D 375	150		D 375
14. Interest on working capital						
Interest on working capital	40		D 40	40		D 40
15. Language training credit						
Official languages training	55	C	55	55	C	55
16. Gross revenue						
Revenue	3,090	C	3,090	3,090	C	3,090
17. Allowances and reruns						
Revenue – allowances etc.	185		D 185	185		D 185
18. Internal charges						
Revenue – internal charges	290		D 290	290		D 290
19. Profit/loss*						
Settlement – common services	30		D 30	30		D 30

*These accounts are shown as they would exist before being closed to Profit/loss. Account 19 only shows the transfer of the net profit to the custodian and omits the closing entries which would precede this transfer.

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TABLE 4. ACCOUNTING ENTRIES AND LINKAGE BETWEEN EDP CENTRE ACCOUNTS AND DEPARTMENTAL ACCOUNTS – cont.

IV. YEAR-END FINANCIAL STATEMENT – EDP CENTRE

This statement simply lists the final balances shown in individual accounts to enable the calculation of the profit or loss. Accounts with NIL balances are not shown. As this is a year-end statement, after settlement of accounts is complete, all "control" accounts (Part III, accounts 8, 9, 10) and "receivables" accounts (5, 6) have disappeared. The expense and revenue accounts have reduced to those originally shown in Part I, col. 2.

Account	Appropriations Basis		Revolving Fund Basis	
	Dr. \$'000	Cr. \$'000	Dr. \$'000	Cr. \$'000
A. ASSET AND LIABILITY ACCOUNTS				
1. Fixed assets, by type	700		700	
2. Equity in fixed assets		525		355
3. Loan from Finance				170
4. Accumulated depreciation		175		175
Totals	<u>700</u>	<u>700</u>	<u>700</u>	<u>700</u>
B. EXPENSE AND REVENUE ACCOUNTS				
11. Direct expenses	2,000		2,000	
12. Production equipment rentals – imputed	225		225	
13. Common services	375		375	
14. Interest on working capital	40		40	
15. Language training credit		55		55
16. Gross revenue		3,090		3,090
17. Allowances and reruns	185		185	
18. Internal charges	290		290	
Subtotals	<u>3,115</u>	<u>3,145</u>	<u>3,115</u>	<u>3,145</u>
19. Profit (loss)	30		30	
Totals	<u>3,145</u>	<u>3,145</u>	<u>3,145</u>	<u>3,145</u>

TABLE 4. ACCOUNTING ENTRIES AND LINKAGE BETWEEN EDP CENTRE ACCOUNTS AND DEPARTMENTAL ACCOUNTS – conc.

V. BUDGETARY COST OF CENTRE AS SHOWN ON DEPARTMENT'S BOOKS

The entries in this Part are from Part II (except as noted), and are in the order in which they occur in Part II. The table illustrates how budgetary accounting can result in apparent cost differences when only a part of the accounts (for a single department) is considered. Entries are numbered as in Part II.

Entry in Department's Books	Appropriations Basis		Revolving Fund Basis*	
	Dr. \$'000	Cr. \$'000	Dr. \$'000	Cr. \$'000
2. Capital vote, fixed assets	200			
2. Loan vote (loan to centre)			200	
3. Operating cost vote		2,000		
4a. Refund of prior year expenses				145
4a. Repayment of loan for centre				30
4b. Interest on fixed assets				35
4b. Interest on loan for centre			15**	15
12a. Non-tax revenue		275		
12b. EDP services received	2,340		2,340	
12b. Due to centre (contra account)		2,340		
12c. Due to centre (contra account)	30			
12c. EDP services received		30		
12c. Recovery of departmental expenses				100
12c. Miscellaneous non-tax revenue				30
Totals	4,570	2,645	2,555	355
Apparent Cost (to Department)	1,925		2,200	
Difference in Apparent Cost			1,925	275

This difference is the amount of common service payments to other departments (government costs \$125,000 plus employee fringe benefits \$150,000). It is offset by revenues recorded by these other departments and therefore has no net effect on the Consolidated Revenue Fund or the actual costs of the Government of Canada.

* The department's books are on an Appropriations basis.

** This item represents charges to the custodian by the Department of Finance for interest on the loan vote (\$15,000). It does not appear in Part II as it is not a transaction between the centre and the department.

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H. IMPLEMENTATION

Implementation of an adequate EDP full cost accounting system will require careful planning, taking full account of the management requirements of the centre and its host department and of the relevant Treasury Board directives and guidelines (both the "Guide on EDP Administration" and the "Guide on Financial Administration").

As a first step in implementation, the management of each EDP centre should:

- establish the objectives of its financial reporting system, and the promptness with which reports are desired,
- determine the responsibility and cost centres for which reports are required, and the general content and frequency of these reports,
- determine which other financial and statistical reports are required, and their general content and frequency.

A financial adviser or team should then be appointed to implement the required system and develop any necessary components. If possible, the financial officer who will be responsible for the operation of the system after implementation should be a member of the implementation team from the outset. The Treasury Board Secretariat will support the work of these teams by advising on interpretation of its directives and guidelines and acting as a focal point for exchange of information and techniques among teams in different centres.

The team, in conjunction with departmental financial staff, should:

1. Examine the feasibility of using or adapting existing departmental or DSS-Services accounting and reporting systems to meet the requirements of the centre either temporarily or permanently, or of establishing a peripheral accounting system for the centre;
2. Develop and recommend to centre management a billing structure for all the operations of the centre;
3. Develop and recommend to centre management a time reporting system for centre staff which meets the needs of the billing structure (this will be especially important for system software and systems and programming staff);
4. Develop and recommend to centre management a simple billing and invoicing system;
5. Develop an accounting system for the centre where it is not feasible to use or adapt existing accounting systems. This may involve:
 - designing and obtaining design approval for the required reports,
 - expanding the list of EDP Expenses and Revenue classes,

- selecting line objects to support these classes, and to provide required information on the Economic Objects (MI-8-66, amended July 1969),
- expanding the list of EDP Services classes,
- selecting service elements appropriate to the information needs of the centre,
- recommending modifications to the initial list of cost centres,
- recommending whether record keeping and report preparation should rest with the centre or the custodian department,
- determining the feasibility of using the centre's equipment to handle the centre's bookkeeping and financial statement preparation,
- designing the required books, forms and other records,
- setting up the memorandum accounts,
- developing a procedures manual,
- directing the preparation of any necessary computer programs.

EDP centre management should then appoint and train any other staff required to operate and maintain the accounting system, prepare records and produce financial reports.

The method of financing selected for any EDP centre will influence some details of the accounting system. The principal differences are indicated in Table 4.

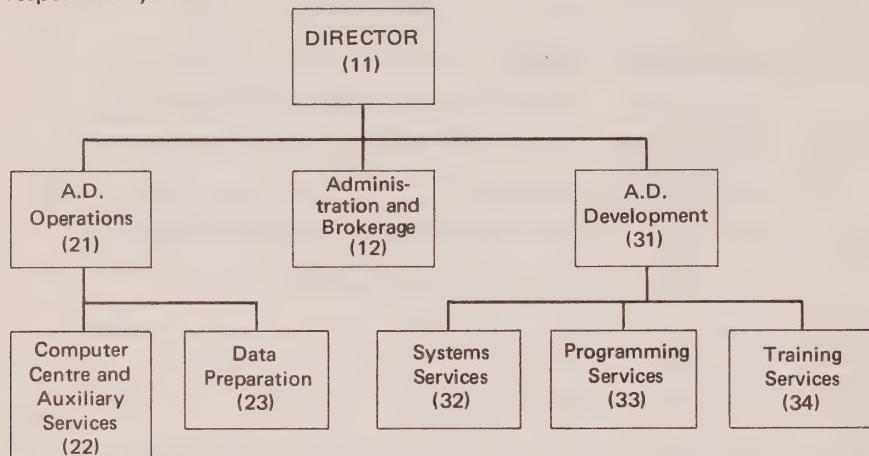
I. MODEL FINANCIAL REPORTS

This section presents examples of the sorts of financial reports which might usefully be generated from an EDP full cost accounting system, and attempts to illustrate a few of the alternatives which might be considered. The reports produced for any EDP centre should, of course, be tailored to the needs of that centre, and not merely be copies of models from this or any other source.

These models assume a centre with its own large-sized batch multi-programmed computer (partly owned and partly rented) providing over-the-counter and terminal access, and its own supporting data preparation operation (key punch and key-to-tape). No use is made of unit record machines or document reading. Interactive computing and COM services are purchased for customers on a fee-for-service basis. Systems, programming and training services are provided internally.

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The centre is organized as shown in the following chart. To simplify the examples, the assistant directorates are defined as responsibility centres and the five units reporting to them as cost centres. In practice, of course, units at the lowest level shown on the chart would usually be defined as responsibility centres, and the cost centres would be sub-units of this organization. Possible responsibility codes appear in brackets within each box of the chart; the first digit indicates the responsibility centre, the second the cost centre within the responsibility centre.



The reports illustrate only some of the alternatives open in report design. Two basic principles are worth emphasizing:

- *Always include comparative data.* Comparisons with a budget or plan, or with the situation a year (or period) earlier, make reports much more meaningful, and more readily interpreted.
- *Select only relevant detail.* The accounting system should have the capability to generate special reports when required. Regular reports should present only those details necessary to identify where changes have occurred, and whether plans are being realized, and to indicate any necessary follow-up.

These sample reports, because they are intended to illustrate options, do not form a consistent set. Reports for any centre should, of course, form a consistent set to minimize duplication of identical detail and facilitate preparation of higher level reports by rolling-up lower level reports.

The first six examples are of possible formats for regular responsibility or EDP service reports (the only significant difference is in coverage, as illustrated by No. 4 and No. 5). The last six are possible "special" or periodic reports, including a possible format for reports from a very small EDP unit. Other more sophisticated report designs are suggested in the "Guide on Financial Administration", Part II, Chapter VII.

1. COST CENTRE REPORT – COSTS
COMPUTER CENTRE AND AUXILIARY SERVICES SECTION (CODE 22)

MONTH		COST ITEM	YEAR TO DATE	
ACTUAL	+ (-) BUDGET		ACTUAL	+ (-) BUDGET
		Personnel Salaries and fringe benefits Overtime Consultants and contract staff Total Personnel		
		Production Equipment Rentals CPU, memory and channels Disk drives and controllers Tape drives and controllers Printers and controllers Terminals and controllers Other configuration components Subtotal computer		
		Copiers Other auxiliary equipment Total Production Equipment		
		Data Transmission Costs*		
		Production Supplies Disks Tapes Paper Other		
		Total Production Supplies		
		Other Direct Costs Accommodation Office furniture and equipment Production equipment maintenance Software acquisition Systems and programming Other		
		Total Other Direct Costs		
		Less: Language training credits		
		TOTAL DIRECT COSTS		

* Could be split to distinguish fixed and variable elements.

Note that this example:

- combines some EDP expense classes (monthly detail unnecessary),
- contains many line objects (where detail desirable for cost control),
- omits such indirect costs as interest on working capital, and assigned shares of centre management, departmental costs and government costs (these would not be omitted if operating results were to be presented on a Profit/Loss basis).

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2. COST CENTRE REPORT – OPERATING RESULTS Profit/Loss Presentation

COMPUTER CENTRE AND AUXILIARY SERVICES SECTION (CODE 22)

	MONTH		YEAR TO DATE	
	ACTUAL	+ (-) BUDGET	ACTUAL	+ (-) BUDGET
REVENUES				
CPU time				
Core occupancy				
Disk occupancy				
Disk data traffic				
Disk mounts				
Tape data traffic				
Tape mounts				
Lines printed				
Cards read				
Cards punched				
Subtotal computing charges				
Terminal rentals				
On-line disk space rentals				
Disk pack rentals				
Tape rentals				
Disk pack storage (user-owned)				
Tape storage (user-owned)				
Tape maintenance (user-owned)				
Subtotal library charges				
Copying				
Decollating – bursting				
Booking – binding				
Subtotal auxiliary charges				
Less: Credits and reruns				
Total Revenues				
COSTS				
Personnel				
Production equipment				
Data transmission				
Production supplies				
Other direct costs				
Assigned costs				
Less: Language training credits				
Total Costs				
PROFIT (LOSS)				

Note that this example:

- presents revenue detail, but assumes costs are detailed on another report,
- includes assigned costs (not detailed on example 1).

3. COST CENTRE REPORT – OPERATING RESULTS
Contribution Presentation

COMPUTER CENTRE AND AUXILIARY SERVICES SECTION (CODE 22)

MONTH		ITEM	YEAR TO DATE	
ACTUAL	BUDGET		ACTUAL	BUDGET
%	\$	\$		
		REVENUES Computing charges Terminal rentals On-line disk space Library charges Auxiliary equipment Subtotal		
		LESS: CREDITS AND RERUNS Computing Terminal rentals On-line disk space Library charges Auxiliary equipment Subtotal		
		Total Revenues	100.0	
		DIRECT COSTS Computer unit Software unit Library unit Auxiliary unit		
		Less: Language training credits		
		Total Direct Costs	100.0	
		CONTRIBUTION TO OVERHEAD Computer unit Software unit Library unit Auxiliary unit Language training credits		
		Total Contribution	100.0	

- The “contribution” presentation may be preferred where overheads are especially heavy and not understood by cost centre managers, or where overheads are likely to cause a persistent loss situation. It is often argued, however, that cost centre managers may not be as concerned with shortfalls in their budgeted “contribution” as with incurring losses.
- This example also shows:
 - use of budget comparisons instead of variances from budget,
 - presentation of detail by lower levels of organization (detailed statements for each lower level are assumed),
 - use of percentage analysis.

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4. RESPONSIBILITY CENTRE REPORT – OPERATING RESULTS Contribution Presentation

DEVELOPMENT DIVISION (CODES 31–34)

ITEM	MONTH		YEAR TO DATE	
	ACTUAL	+ (-) BUDGET	ACTUAL	+ (-) BUDGET
A. COSTS				
Salaries and employee benefits				
Consultants and contract staff				
External facilities				
Internal charges				
Accommodation				
Travel				
Other direct costs				
Less: Language training credits				
Total Direct Costs				
Interest on working capital				
Centre management				
Departmental costs				
Government costs				
Total Overhead Costs				
Total Costs				
B. CONTRIBUTIONS				
Systems Services				
Revenues				
Less: direct costs				
Contribution \$ % of costs				
Programming Services				
Revenues				
Less: direct costs				
Contribution \$ % of costs				
Training Services				
Revenues				
Less: direct costs				
Contribution \$ % of costs				
Total Contributions				
Less: Development Admin. Costs				
Overheads				
TOTAL PROFIT (LOSS)				

This report shows costs in terms of the Expenses classes (omitting irrelevant and minor classes and grouping 02 and 05) and contributions by component cost centres, with adjustments to a profit/loss basis for the responsibility centre. The internal charge for centre management is shown with overheads.

5. EDP SERVICE REPORT – OPERATING RESULTS**Profit/Loss Presentation****SYSTEMS AND PROGRAMMING SERVICES GROUP**

MONTH		ITEM	YEAR TO DATE	
Last Year	This Year		ACTUAL	+ (-) BUDGET
		A. COSTS Salaries and employee benefits Consultants and contract staff External facilities Software acquisition Accommodation Office furniture and equipment Travel Printing and stationery Telephone and telegraph Interest on working capital Other expenses Department costs Government costs Internal charges Less: Language training credits Total Costs		
		B. SERVICE CLASS RESULTS Systems Services Revenues Costs Profit (Loss) \$ % of revenues Programming Services Revenues Costs Profit (Loss) \$ % of revenues Totals Revenues Costs Profit (Loss) \$ % of revenues		

This report looks much like example 4, but:

- the figures would be lower throughout part A. (Training Services is excluded from the EDP Services group report),
- no distinction is made between direct and overhead costs (this distinction would not be incorrect in this report),
- profits are expressed as a % of revenues, whereas contributions were expressed as a % of costs,
- the month is compared with last year, rather than budget (perhaps useful in growth situations).

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6. EDP CENTRE RESPONSIBILITY SUMMARY – OPERATING RESULTS Profit/Loss Presentation

ITEM	MONTH		YEAR TO DATE		COMMIT- MENTS	UNCOM- MITTED
	ACTUAL	+ (-) BUDGET	ACTUAL	+ (-) BUDGET		
REVENUES						
Computing charges						
Terminal rentals						
Library charges						
Auxiliary equipment						
Systems services						
Programming services						
Training services						
Brokerage						
Less: Credits and reruns						
Total Revenues						
COSTS						
Salaries and benefits						
Consultants and contract staff						
Production equipment						
Data transmission costs						
External facilities						
Production supplies						
Accommodation and furniture						
Travel						
Other expenses						
Departmental and govt. services						
Internal charges						
Less: Lang. training credits						
Total Costs						
OPERATING RESULTS						
Operations						
Revenues						
Costs						
Profit (Loss)						
Development						
Revenues						
Costs						
Profit (Loss)						
Administration						
Revenues						
Costs						
Profit (Loss)						
TOTAL PROFIT (LOSS)						

The new features are the columns for "commitments" and "uncommitted". Addition of these columns makes this summary more useful for expenditure control. Revenues include internal charges to balance their inclusion in costs. Net revenues and costs (excluding internationals) could be shown instead.

7. PERSONNEL UTILIZATION – EDP SERVICE BASIS**SYSTEMS AND PROGRAMMING SERVICES GROUP**

MONTH HOURS	% By Source	STAFF HOURS	YEAR TO DATE		
			%	ACTUAL	BUDGET
		Standard working hours paid Overtime hours paid			
100.0		Total hours paid	100.0		
		By Use			
		Chargeable to user projects Customer services Training Language training Unassigned Vacation Illness and leave			
100.0		Total hours used	100.0		

This type of report might be especially useful for labour-intensive EDP services (or cost centres), but could also be of value in a computer services unit, with allocations by machine replacing the "user projects" and "customer services" headings.

Note that "Budget" in this case refers to man-hours, not to dollars!

8. PROJECT COST SUMMARY – PROGRAMMING SERVICES SECTION (CODE 33)

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PROJECT NO.	PROJECT NAME	YEAR TO DATE BUDGET		CUMULATIVE COST BUDGET		% COMPLETED ACTUAL BUDGET	COMMENTS
		ACTUAL	BUDGET	ACTUAL	BUDGET		
	Projects completed to end of last month						
	Projects in progress over \$50,000 (by stage)						
	Projects in progress under \$50,000						
	TOTAL						

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9. REVENUE ANALYSIS
COMPUTER CENTRE AND AUXILIARY SERVICES SECTION (CODE 22)

RATE ITEM	UNIT OF RECORD	UNITS		DOLLARS		
		LAST YEAR	THIS YEAR	LAST YEAR	THIS YEAR	BUDGET
CPU time						
Core occupancy — first 200K						
— over 200K						
Calculated elapsed time						
Priority charges — fast						
— standard						
— slow						
Disk — occupancy						
— traffic						
— mounts						
Tape — traffic						
— mounts						
Printer — lines						
— set-up						
Cards — read						
— punched						
Terminal rentals						
On-line disk space						
Disk pack rentals						
Tape rentals						
Disk pack storage						
Tape storage						
Tape maintenance						
Copying						
Decollating — bursting						
Booking — binding						
Non-billables — computer						
— terminals						
— on-line disk						
— library						
— auxiliary						
Totals						

A percentage revenue analysis might also be helpful periodically.
This report combines financial and physical data.

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10. KEY FACTORS - MONTHLY TRENDS

ITEM	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.
Revenues – Operations Division – Development Division – Other												
Credits and Reruns												
Profit/Loss – Operations Division – Development Division – Other												
Cost of External Facilities												
Number of Computer Jobs												
Computer Jobs Completed Late												
Records – Produced/Operator – Verified/Operator												
Data Conversion Error Rate												
Systems Section – Hours Sold – Starts – Completions												
Programming Section – Hours Sold – Starts – Completions												
Month-end Strength												

Note this report combines financial data with data from other sources.

11. BALANCE SHEET

	LAST YEAR	THIS YEAR	BUDGET
Current assets			
Petty cash			
Cash on deposit with Receiver-General			
Accounts receivable (incl. employee advances)			
Prepaid charges			
Inventories			
Work-in-progress			
Less: Current liabilities			
Accounts payable			
Accrued charges			
Common services accounts			
Departmental control accounts			
WORKING CAPITAL			
Purchase credits (depreciated)			
Fixed assets			
Production equipment			
Less: Accumulated depreciation			
Office furniture and fittings			
Less: Accumulated depreciation			
NET ASSETS			
Represented by capital accounts			
Purchase credits (depreciated)			
Assets financed from appropriations			
Revolving fund – total available			
Earned surplus (deficit)			
at beginning of year			
at end of year			
NET EQUITY			

Balance sheets should be prepared annually for inclusion in annual reports.

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12. MICRO-UNIT REPORT

ITEM	LAST YEAR	THIS YEAR		
		ACTUAL	BUDGET	VARIANCE
COSTS				
Production equipment rental — imputed				
Production equipment maintenance				
Production supplies				
Total, equipment — related				
Salaries and employee benefits				
Other direct costs				
Total Direct Costs				
Interest on working capital				
Departmental overheads				
Government overheads				
Total Full Costs				
COMPUTER USE (Model)				
Hours of productive use				
— testing				
— production				
Down time				
Unassigned				
Total Hours				
COST/HOUR OF USE*				

This model shows the sort of data that might be reported by a small unit with an owned minicomputer and a programmer or two, used in support of a particular research function. Only significant EDP expenses classes are shown, and data on computer use and cost/hour appear instead of revenues. For roll-up with other costs, revenues would be assumed to equal costs as follows:

$$\text{equipment revenues} = \text{equipment-related costs} + \text{share of overheads}$$
$$\text{programmer revenues} = \text{salaries and other direct costs} + \text{share of overheads}$$

A summary report of this type would probably keep both the user and departmental management adequately informed of full costs, and would provide a basis for assessing alternative sources of EDP. The frequency of such reports would be determined by departmental management.

* Total equipment — related costs divided by hours of productive use.

Chapter	VII-4
Date	August, 1974

APPENDIX VII-4**INSTRUCTIONS FOR EDP CENTRE
QUARTERLY FINANCIAL REPORTS**

Each EDP centre or large common-service EDP staff designated by the Treasury Board Secretariat is required to report summary information on full EDP costs and actual or pseudo EDP revenues to the Secretariat in the detail and form specified and periodically revised by the Secretariat in consultation with the EDP Advisory Committee.

Current financial information is necessary to the Secretariat to permit it to discharge its responsibilities for:

- assessing the EDP plans of centres and users, and relating these plans to the overall requirements of the government for EDP services,
- monitoring EDP performance against plans.

The attached table specifies the financial detail which each EDP centre and designated staff should report to the Secretariat commencing with the April-June quarter of 1974. The table is specified in terms of the classifications of EDP Services and EDP Expenses and Revenues; the meaning of each class is described or illustrated in Part F of Appendix VII-3.

It is recognized that most centres and designated staffs will not have in place by April, 1974, an accounting system adequate to capture and display the full costs and revenues of EDP activities. In such cases, the officer responsible for the EDP centre should contact the Information Systems Division of the Secretariat to discuss reporting arrangements appropriate to his circumstances. Modifications of the detail and timing of reports will be permitted for 1974-75 to the extent necessitated by the circumstances of each case.

It is expected that monthly detail will be required on these reports commencing in 1975-76. There may also be modifications to the selection of Expenses and Revenue classes, and some EDP Services classes may be required. For the first year the selection shown in the table, reported on a quarterly basis, will be sufficient.

This report and the report on computer performance specified in Appendix VIII-3 are the only quarterly reports to the Secretariat required by the EDP Guide.

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QUARTERLY EDP FINANCIAL REPORT TO THE TREASURY BOARD SECRETARIAT

Reporting Centre: Report Period:

Officer to Contact: Telephone No.:

Item	Actual	Budget	Variance
A. EDP EXPENSES (full costs)*			
Salaries and Employee Benefits (02, 05)			
Consultants and Contract Staff (08)			
Prod. Equipment and Software (12, 15, 18, 27)			
Data Transmission Costs (21)			
External Facilities (24)			
Production Supplies (39)			
Accommodation (44)			
Other Costs (48, 52, 55, 58, 61, 69)			
Departmental Costs (72)			
Government Costs (75)			
Internal Charges (89)			
Language Training — deduct (78)			
FULL EDP COSTS			
B. OPERATING RESULTS, by EDP Service Group			
Computer and Related Services			
Revenues**			
Full Costs***			
Surplus (Deficit)***			
Systems and Programming Services			
Revenues**			
Full Costs***			
Surplus (Deficit)***			
Other EDP Services			
Revenues**			
Full Costs***			
Surplus (Deficit)***			
Total Operating Results			
Revenues**			
Full Costs			
Surplus (Deficit)			

* EDP Expenses class codes included are shown in brackets.

** Exclude credits and reruns, but include internal charges.

*** At the option of the reporting centre "Direct Costs" and "Contribution" may be substituted at the EDP Services group level, but not at the total level.

Chapter	VIII
Date	August, 1974

GUIDE ON EDP ADMINISTRATION

COMPUTER PERFORMANCE IMPROVEMENT

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APPENDICES

VIII-1. CHECKLIST OF UTILIZATION STATISTICS

VIII-2. EVALUATION TECHNIQUES

VIII-3. INSTRUCTIONS FOR EDP CENTRE QUARTERLY COMPUTER
PERFORMANCE REPORTS

DIRECTIVES

- 6.1 Each department or agency operating computer installations shall monitor the performance of those installations on a continuous basis, in a manner appropriate to the size and use of each installation.
- 6.2 Each department or agency operating computer installations shall report summary performance and utilization information to the Treasury Board Secretariat in the detail and form specified and periodically revised by the Secretariat in consultation with the EDP Advisory Committee.
- 6.3 The Information Systems Division of the Secretariat shall ensure the dissemination of information on performance monitoring and improvement efforts and their results, and the exchange of basic operating statistics among government installations.

GUIDELINES

- 6.4 Performance evaluation and improvement should be applied to all areas of an installation's operation which directly or indirectly influence the level of service provided to users or the efficient utilization of equipment, including hardware, operating systems, operating procedures, applications software and communications equipment.
- 6.5 At each computer installation, detailed utilization statistics should be kept and regular reports of summarized data provided for internal management purposes. Other evaluation and improvement efforts should also be maintained on a scale proportionate to likely benefits.
- 6.6 Each medium and large scale computer installation should consider conducting occasional major or one-time performance improvement efforts: for example, before lack of processing capacity is expected to require an upgrade of existing equipment.
- 6.7 The basic performance criteria for any installation should be considered and approved by the installation's policy advisory board or committee, or equivalent.

A. INTRODUCTION

In recent years the use of EDP by government departments has increased dramatically, with corresponding cost increases. For departments operating equipment, hardware costs are usually a major expense. The increasing demand for EDP has brought continuous pressure for the enhancement of computer facilities, with an accompanying increase in management's concern about the cost effectiveness of current EDP systems and about the efficient utilization of equipment.

Performance evaluation and improvement is a relatively new activity at many government computer installations. This chapter outlines those areas most suitable for performance improvement and suggests the general form that this effort should take, including suggested responsibilities for staff working in the performance area.

The benefits available through the use of evaluation techniques are difficult to quantify, but it is widely accepted that they are significant. For example, an August 1972 report to Congress from the General Accounting Office of the United States, affirms that significant increases in efficiency of many installations are possible with the use of evaluation techniques, and in particular that the initial use of hardware monitoring devices should result in increasing the efficiency of computer systems by about 25 per cent.¹ The experience of systems programmers and analysts interviewed in preparing this chapter supported these findings.

Satisfactory performance cannot be achieved without efficient operational procedures, which should be reviewed regularly. The chapter includes a checklist of operational areas which should be covered in such a review. The efficient utilization of equipment also depends on the efficiency of application programs, and some aspects of application software improvement are included.

Improvement of the effectiveness of EDP in general requires evaluation of other aspects of performance as well as of computer installations. An evaluation of EDP analysis and programming resources can be based on a combination of cost and project control data. Evaluation of other EDP personnel resources such as operations and system software staff can be based on a combination of total machine costs (including support overhead) and data relating to equipment utilization and user service provided. These areas have not been discussed in this chapter, but are expected to be studied in the near future.

B. ORGANIZING FOR PERFORMANCE IMPROVEMENT

Performance evaluation and improvement efforts should be applied to all areas of an installation's operation which directly or indirectly influence the level of service provided to users or the level of utilization of equipment. More specifically it should be applied to:

- *Hardware*, including the utilization of individual components of the system, simultaneous operation of system components, surplus capacity, enhancement requirements and reliability;
- *Applications*, including the fitting of applications to the configuration, the efficiency of individual programs, user satisfaction, user education, centre compatibility, records management and lifetime cost;

1. Comptroller General of the United States: "Opportunity for Greater Efficiency and Savings Through the Use of Evaluation Techniques in the Federal Government's Computer Operations", Report to the Congress, Aug. 22, 1972, Ref. No. B-115369.

- *Operating systems*, including executive overhead, location of system programs and utilities, contention for resources and software tuning;
- *Operating procedures*, including servicing of messages, job scheduling, availability of supplies and computer room layout;
- *Communications equipment*, including the adequacy and availability of service, overhead of communications software, reliability and response times.

To make measurements and collect data from this variety of areas, and to analyse performance and identify improvement possibilities, requires considerable co-ordination in order to avoid duplication of effort and to allow for the effect of changes in one area upon another. This co-ordination can be achieved by centralizing the responsibility for performance evaluation at each installation. Centralization will also facilitate exchange of information among departments on evaluation and performance improvement techniques.

Performance evaluation activities can be summarized as follows:

- to collect, summarize and analyse the installation's job accounting data;
- to undertake other in-house performance measurement activities;
- to maintain a set of benchmarks representing the installation's workload;
- to advise operations and systems programming personnel on the efficient and effective utilization of equipment;
- to make recommendations to management on hardware and software configuration changes or enhancements;
- to maintain effective liaison and communication with other performance evaluation groups on performance improvement techniques;
- to produce summary performance and utilization reports; and
- to assist in audit and procurement activities.

The centralization of responsibility for performance evaluation should not be allowed to reduce the very real contributions of line managers and supervisors to performance improvement. Rather, it should provide a focus for their efforts, an ear for their suggestions, and a stimulus to further improvement. No performance evaluation staff can afford to be regarded as an adversary by those who should be its allies.

The improvement of performance through the application of measurement and evaluation techniques provides the justification for the cost and effort of performance evaluation. Performance evaluation activities should therefore be planned on the basis of projected cost savings taking into account the overall size, cost and complexity of the installation. In general, an interactive mode installation will require about fifty percent more resources for performance evaluation than will a batch multiprogramming environment of comparable size, and there will be a comparable further increase in the case of a data-base/communications environment (i.e., an environment in which large data bases are updated or utilized via communications links). It is important that the results of performance evaluation be continuously monitored to help ensure that the size and scope of the effort is consistent with the EDP operation it is serving.

System or procedure changes to increase efficiency made following any performance evaluation will have been based on the existing hardware, software, workloads and operating environment. Changes to the system or changes in the workload will gradually erode the basis of any evaluation, and the potential for improvement will again increase. Where changes are occurring regularly, continuous monitoring and evaluation is justified.

C. OPERATIONS REVIEW

Installation operations are assumed to include the control, organization and implementation of the procedures which affect the flow of information through the data processing function. These include:

- *Data preparation*, including preparation of programs in machine-readable form from source documents, and preparation of data in machine-readable forms from source documents;
- *Input data control*, including organization of the flow of data between processes and the assembly of data for processing;
- *Scheduling*, including organization of the order in which jobs are processed to meet schedules and to optimize utilization of the equipment;
- *Machine operation*, including the servicing of console messages, maintaining the flow of data during processing, and keeping adequate logs of unusual situations not recorded by automated job accounting methods;
- *Output data control*, including the assembly of output, its checking and validation, and its delivery.

Overall performance will be adversely affected by bottlenecks or lack of organization and efficient procedures in any of the operational areas. A periodic review of operations usually results in significant performance improvements. Some of the areas which should be reviewed are:

- *Operator consoles:* Are there sufficient consoles? Are messages delayed? Are there too many messages on particular consoles? Are all messages necessary?
- *Job flow:* For jobs requiring turnaround, what delays occur and where? Are all the data preparation steps necessary?
- *Job control:* Are adequate service request forms used? Are they necessary? Can job status be readily checked?
- *Disk/tape library:* Is the disk/tape library conveniently located? What is the delay in servicing requests? Are frequently used disks/tapes located separately? Are exterior labels legible and unambiguous?
- *Performance measurement:* Are adequate records kept of equipment maintenance and significant failures? Are self-measuring performance reports used for operations? Is liaison with centre performance staff adequate? Have configuration bottlenecks been adequately described to operations staff?
- *Scheduling:* What is the scheduling strategy attempting to achieve? Have centre performance and systems staff been consulted to coordinate the external scheduling strategy with any internal scheduling algorithms? Would a software scheduling package be useful? When were scheduling packages last evaluated?
- *Supplies:* Are supplies adequate? Is an accurate inventory of supplies kept? Do records show when lack of supplies curtails production? What are the re-order levels of all items? How are requirements for known production processing handled?
- *Computer room layout:* Are operators experiencing communication problems which could be alleviated by a different computer room layout?
- *Career path:* What career path is established for operating staff at the centre? What is the training program for operators? What turnover rate is being experienced with operators?

Most installations have grown and developed through several generations of EDP equipment with associated increases in the complexity of computer operations. Offsetting this increased complexity has been a greater availability of operational aids, both hardware and software. A survey of such aids as on-line monitoring devices, job scheduling packages, tape library systems, console support packages, etc., should be made periodically in association with operational reviews.

D. UTILIZATION STATISTICS

It is anticipated that accounting routines will be operating at all installations for the purpose of identifying user costs. Many of the fundamental data used by accounting algorithms are also useful as performance measures. It is important to ensure that these quantitative data are kept in a form suitable for subsequent performance analysis. Selective summaries of these data should make workload characteristics and processing activity visible to management.

Each installation will rely to a large extent on manufacturer-supplied software to capture use statistics. Statistics collectors cause system overhead, the overhead being dependent on the variety and frequency of collection points. In addition, for different modes of operation, individual statistics may have different meanings or may not be useful indicators of overall system utilization. Appendix VIII-1 gives a checklist of statistics which might be useful for internal performance evaluation for three different modes of operation (serial processing, multiprogramming and time-sharing). It is not intended that this checklist be applied rigidly; allowance must be made in each case for the availability of data, its cost of collection, and its appropriateness as a descriptor in each environment.

It may be particularly useful to centre management to maintain statistics in a manner which permits identification of differences in work loads or resource utilization at different times of the day (or week). Knowledge of workload patterns is especially helpful in responding to potential customers with emergency or temporary overload requirements, and can be a valuable aid in scheduling to maximize throughout. Also of special value are statistics on the extent of use of individual items of equipment, which provide a guide to both cost control and marketing efforts.

Many of the statistics, in particular the number of concurrent jobs, turn-around and response times, are most useful when tabulated as distributions. For ease of interpretation and for identifying trends, graphical representation of important use statistics should be considered. Statistical analysis of use statistics can often help to evaluate hardware and software changes, avoiding the expense and overhead of additional measurement techniques.

Installations which operate a mix of modes should maintain the statistics relevant to each mode, including the fraction of time and resources devoted to each mode. Where more than one operating mode is in use, centres will be expected to provide an explanation with the statistics reported to the Treasury Board.

E. APPLICATION SOFTWARE

A considerable increase in the efficiency of equipment resource utilization may result from improvements in the design and code of application software. As creating efficient code or optimizing existing programs itself utilizes resources, there is an appropriate level of effort to apply in each case.

Before application programs are accepted as production the following parameters should be ascertained:

- frequency of production runs,
- estimated elapsed time per production run,
- approximate resource utilization per run,
- planned replacement date.

From these data a gross estimate of the total lifetime cost of running each production program can be obtained. It is on this cost that the decision as to the level of effort to expend on optimization should be based.

Optimization effort can be conveniently divided into three levels:

- external parameters (including peripheral usage),
- program and system design,
- program code.

The first level is normally achieved by a scan of the control cards and peripheral request cards (or equivalent) submitted with the program. It consists of a review of the distribution of files on available peripherals together with input/output parameters.

The second level of optimization involves a review of the program or system documentation. At this level the appropriateness to the installation of the file structure, file organization and programming language would be reviewed.

The third level of optimization involves the use of appropriate software tools for program code analysis, including source and object code optimization.

Optimization of external parameters will normally be the application programmers' responsibility. To facilitate the use of optimum input/output control parameters, programmers using the centre should receive explicit instruction on this type of optimization. A review of samples of the centre job stream by centre performance staff can often identify instances where optimum parameters are not being used.

The resources expended on design and code optimization should be consistent with the total running cost to replacement of each program. Code optimization should not normally be applied to an application program until after a period free of application software errors.

Attention is drawn to currently available software tools for code optimization. In particular optimizers for COBOL source and COBOL generated object programs are available. Most COBOL source programs can be improved by use of these tools. Reducing resource utilization by a few per cent can amount to large cost savings for a frequently used production program. All centres where production COBOL programs are important should have these tools available.

The evaluation and improvement of application software is clearly a joint responsibility of the centre, its users and the programming staff employed by the users. Only if the performance evaluation staff receives the full co-operation of users and programmers can efficient software be achieved at reasonable cost. As in the case of operations review, the performance evaluation function must be regarded as a partner by the programmers whose work is reviewed, and not as a fault-finding adversary. One of the strongest claims for structured programming is that it simplifies the review and maintenance of programs after development.

F. ONE-TIME EVALUATIONS

When it is established, (for example, from use statistics and comparisons with similar installations) that performance is below optimum, then a concerted effort to identify system bottlenecks and to find ways of removing them should be considered. Before such a study is undertaken, care should be taken to ensure that as much as possible has been done with existing use statistics to evaluate reasonable performance improvement hypotheses. This process will assist in identifying where gaps exist in system performance data and allow measurement activity to concentrate on the missing areas.

When planning a performance evaluation study it is important to remember that computer performance measurement is subject to a law of diminishing returns: gains in system performance through measurement and evaluation are not maintained in proportion to additional effort. It is also important to make adequate allowance for the analysis of the measurement data to be collected. In most instances the measurement and data collection process is simpler and less time-consuming than the analysis and interpretation of the data. Interpretation is aided by the clear and concise formulation of improvement hypotheses before and during the evaluation exercise.

A major performance improvement effort will normally make use of measuring devices not in continuous use at the centre to monitor the system. Consultant assistance will probably be required in order to connect the measuring device to the host system and also to interpret the resulting measurements. Measurements should be made under various controlled conditions and over a suitable period of time to take account of variations in the installation workload. Care should be taken that the overall picture of the operation is examined before evaluation becomes detailed and measurements are made on the computer system itself. Performance criteria should be reviewed before being used to identify unsatisfactory aspects of the current operation.

Subsequent analysis of the data should lead to a clear representation of the system performance, displayed in such a way that performance improvement hypotheses can be evaluated, and further improvement areas identified. In the multiprogramming environment where the primary performance criterion is greater throughout, a system profile which displays graphically the utilization of the major components of the system, indicating those functions which are simultaneous, is the most common way to represent evaluation data. From this profile, possibilities for more efficient utilization of system components, and those components causing possible bottlenecks in system throughput, can be identified.

APPENDIX VIII-1

CHECKLIST OF UTILIZATION STATISTICS

	Mode of Operation			
	Units	Serial	Multi-programming	Time-Sharing
Total Facility Use:				
Scheduled hours of operation	Hrs.	X	X	X
Power on and work in progress	Hrs.	X	X	X
- on customer jobs	Hrs.	X	X	X
- demand processing	Hrs.		X	X
- scheduled jobs, only	Hrs.		X	X
- on in-house tasks only	Hrs.	X	X	X
- software	Hrs.		X	X
- accounting	Hrs.		X	X
Down time	Hrs.	X	X	X
- hardware malfunction	Hrs.	X	X	X
- software malfunction	Hrs.	X	X	X
- preventive maintenance	Hrs.	X	X	X
Degraded operation	Hrs.	X	X	X
System initialization	No.		X	X
Central processor use	CPU Hrs.		X	X
- problem programs	CPU Hrs.		X	X
- executive mode	CPU Hrs.		X	X
- I/O wait	CPU Hrs.		X	X
Peripheral processor use	PP Hrs./PP		X	X
Main core use	K. bits x Hrs.		X	
Average I/O rate (or I/O request rate)	bits/sec.		X	X
- to/from disk	bits/sec.		X	X
- to/from tape	bits/sec.		X	X
- to/from other devices	bits/sec.		X	X
Direct access storage				
scratch space used	K. bits x Hrs.		X	X
- by problem programs	K. bits x Hrs.		X	X
- by operating system	K. bits x Hrs.		X	X
Direct access storage user				
space permanently mounted	K. bits		X	X
Disk mounts	No.		X	X
Tape drive use	Av.Hrs./drive	X	X	X
Tape mounts	No.		X	X
Tapes kept	No.		X	X
Cards read	No.	X	X	X
Lines printed	No.	X	X	X
Connect time/terminal	Hrs.		X	X
Documents/pages read	No.	X	X	X
COM frames produced	No.	X	X	X
Plotter time used	Hrs.	X	X	X

APPENDIX VIII-1

CHECKLIST OF UTILIZATION STATISTICS

		Mode of Operation		
	Units	Serial	Multi-programming	Time-Sharing
Workload Data:				
Batch jobs completed	No.	X	X	X
- from terminals	No.		X	X
- on-site	No.		X	X
Abnormal terminations	No.	X	X	X
- from terminals	No.		X	X
- on-site	No.		X	X
Average number of steps/job	No.		X	X
- from terminals	No.		X	X
- on-site	No.		X	X
Average concurrent batch jobs	No.		X	X
Average elapsed time/batch job*	Min.	X	X	X
Average CPU time/batch job*	CPU Min.		X	X
Average core requested/batch job*	K. bits		X	X
Average core used/batch job*	K. bits	X	X	X
Average data transferred (or I/O requests)/batch job*	K. bits	X	X	X
Average DAS scratch used/batch job*	K. bits	X	X	X
Average tape drives allocated/ batch job*	No.	X	X	X
Average tape mounts/batch job	No.	X	X	X
Average tape keeps/batch job	No.	X	X	X
Average cards read/batch job	No.	X	X	X
Average cards punched/batch job	No.	X	X	X
Average lines printed/batch job*	No.	X	X	X
Average turnaround/batch job*	No.	X	X	X
Batch jobs completed on schedule	No.	X	X	X
Batch jobs completed late	No.	X	X	X
Conversational sessions:				
- number	No.			X
- average line connect time*	Min.			X
- average number in progress	No.			X
- average CPU time*	CPU Min.			X
- average response time*	Sec.			X
- average data transferred (or I/O requests)*	K. bits			X
No. of executions of major utilities	No.	X	X	X
Console messages requiring action	No.	X	X	X

* Items usefully tabulated as distributions.

EVALUATION TECHNIQUES

The following table lists the more common techniques available for performance evaluation. The appropriateness of each technique in the various performance evaluation situations is indicated in the table. A brief description of each technique follows:

	Initial Configuration	Configuration Enhancement	Software Tuning	Workload Analysis	Capacity Estimation
Hardware Monitor	M	S	M	S	M
Software Monitor	M	S	M	M	S
Simulation					
Discrete Event	S	M	S	S	M
Algorithmic	S	M	S	S	M
Benchmarks	M	S	M	M	M
Analysis of Accounting Data	S	S	S	M	M

M — major analysis method

S — supporting method

1. Hardware Monitors

There are three basic types of hardware monitors: counter type, counter plus distributor type and minicomputer type. These monitors are attached by means of probes to the logic circuitry of the host system and are transparent to the host system. They collect data and display or store it, usually on magnetic tape. Stored data can be analyzed later by data reduction programs usually run on the host system.

The counter type is the simplest and merely consists of probes, logic, and a series of hardware accumulators which can either count or time events. Numbers of events are periodically displayed and/or stored. This type of monitor is useful in measuring such factors as CPU busy time in executive and/or user program mode, channel busy time, device busy time, number of disk seeks, etc. It is of less use in presenting a chronological history of memory usage or mass storage usage.

The counter plus distributor type combines the facilities of the counter type with the ability to "map" memory or mass storage. The distributor consists of memory and logic in the monitor itself which can count events over a range of addresses (event mode) or list each address occurrence (store mode). In event mode, for example, the distribution of activity throughout memory or in sections of memory can be measured and stored. In store mode, for example, disk seek addresses can be counted as they occur and stored.

APPENDIX VIII-2

The minicomputer type merely replaces counters, logic and the distributor with a minicomputer and its associated memory. It essentially performs all the functions of the counter plus distributor type with an additional capability of dynamically modifying its sampling scheme. However, as the minicomputer requires its own software execution time, it is usually slower in sampling than the previous types.

For an initial study of a system, the counter type is usually sufficient. It will yield the basic resource utilization of the host system such as CPU utilization, channel busy time, etc. Any in-depth study of the system software requires the counter plus distributor type or the minicomputer type. Usage of these monitors is governed by the amount of time and money available for the monitoring and subsequent data analysis.

Hardware monitors are primarily used to evaluate existing systems. However, they can be used to aid in application system design by monitoring program performance in a "test-bed" environment.

2. Software Monitors

There are two types of software monitors: those using a sampling technique and those using an event driven technique (i.e., task switch, program start/stop, I/O interrupt, etc.). As these monitors use host computer resources, they tend to distort the system by interfering with normal operations during the measurement process. However, sophisticated monitors are able to measure their own effect on the system.

Sampling monitors interrupt the system at regular intervals and by inspecting system software control blocks, determine what the system has been doing during the sample period. As these sample rates are typically slow compared to the rate the system changes state, the results obtained must be analysed with care. Increasing the sample rate increases the overhead.

Event driven monitors operate at the occurrence of any or all changes in machine state (usually I/O interrupts); the number of times the monitor gains control determines the amount of overhead it engenders. This type of monitor is inherently more accurate and flexible than the sampling type, because it "sees" each event requested rather than a sample of occurrences of the event. Event driven monitors do tend, however, to require large quantities of host computer resources.

As do hardware monitors, software monitors generally require two "passes": one to gather data, and one to reduce and analyze it. Software monitors are simpler to use than hardware monitors as they merely require execution of code in the host system. They do, however, introduce host system overhead and are less accurate than hardware monitors. Software monitors being less expensive to acquire are more suitable for use on a regular basis to evaluate system performance.

3. Simulation

Another useful evaluation tool is simulation. Simulation can be used to project the performance of an existing computer configuration or of a planned configuration provided there is sufficient information available to enable the simulation to represent the system. There are two basically different approaches to simulating a computer system, i.e., the event oriented simulation and the algorithmic model.

The event oriented simulation attempts to represent the actual operation of a computer system with a computer program. The characteristics of the system, both hardware and software, have to be known in detail and the flow of control while the system is operating understood in order to represent them as logical paths in the simulation program. Computer languages oriented towards this type of simulation are available and simplify the task of developing this type of program. The disadvantages of this type of simulation are the very high cost of program development and the very large programs produced, resulting in high running costs to obtain simulation results. In addition, such programs tend to be very specialized and not easily adapted to other systems or even modified to accommodate design changes. The expense of developing an event oriented simulation of a complete system is usually prohibitive. However, this approach is often useful for evaluating parts of a system, for example: disk access methods, communications networks, front end processors, etc.

The algorithmic model incorporates empirically derived algorithms, containing factors derived from actual measurements, to describe the performance of each hardware and software component of the system. The model also uses parameters related to the workload of the system. Several commercial packages are available which are suitable for system simulation and evaluation. They are relatively easy to use, requiring that the simulation analyst describe the hardware and software components, usually in the manufacturer's nomenclature, and rely on a factor library, which is normally incorporated in the software, to provide the capabilities of the components. The workload is described in fairly straightforward terms and the simulator then "builds" a model of the system, and provides simulation output in table form embodying the type of data one would expect from monitoring the actual system. The main disadvantage of this type of simulation is limited absolute accuracy, especially when modelling relatively new components of hardware and software, the factors for which may not be fully developed. For some components, factors may not be available at all. Another disadvantage of present algorithmic model packages is that they are designed for batch processing systems, and therefore have limited usefulness for transaction-driven systems.

In both types of simulation, the model accuracy is greatly dependent on the analysts' description of the system to be modelled. In the case of algorithmic packages accuracy is also dependent on vendor factors and algorithms. Obviously, models are not as accurate as actual measurement but are extremely useful in doing comparisons of various systems and workload variations. As such, they are most often used in analyzing possible courses of action in future systems rather than to model existing ones. Performance evaluation data can be used to calibrate such analytical models, greatly enhancing their reliability for evaluating system changes.

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4. Benchmarks

Benchmarks are programs which represent either actual workload or expected workload. They provide the most convenient means to compare various systems under evaluation. Used in conjunction with monitors, they show the comparative performance of various system components (i.e., compilers, CPU, channels, etc.).

Benchmarks must be used with caution since there are many factors which can cause the results of benchmark evaluation to be misleading. Care should be taken to ensure that benchmarks are truly representative of the workload to be evaluated, and that benchmarks which are used over a period are modified to reflect workload changes. When using benchmarks on a test system it is important to ensure that the operating environment, software, hardware and procedures, are the same as envisaged for the final system.

5. Analysis of Accounting Data

An often overlooked method of evaluating computer system performance is the analysis of accounting data. Accounting data will normally be collected at all centres for identifying user costs and will thus be available for analysis with little extra data collection cost. It is suitable for workload analysis, and for analysis of gross performance measures such as memory utilization, CPU utilization, total I/O and average revenue produced. Statistical analysis of accounting data before and after system modifications can be a useful basis for evaluating system changes.

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Date	August, 1974

APPENDIX VIII-3**INSTRUCTIONS FOR EDP CENTRE
QUARTERLY COMPUTER PERFORMANCE REPORTS**

Each EDP centre or large common-service EDP staff designated by the Treasury Board Secretariat, and which operates a computer installation, is required to report summary performance and utilization information on each of its computers to the Secretariat in the detail and form specified and periodically revised by the Secretariat in consultation with the EDP Advisory Committee.

Current performance data is necessary to permit the Secretariat to discharge its responsibilities for:

- identifying unused government computing capacity to which work should be directed,
- assessing the EDP plans of centres and users, and relating these plans to the overall requirements of the government for EDP service,
- monitoring EDP performance against plans.

In the current state of the art, it is not possible to prescribe a uniform set of current utilization statistics which must be reported by all centres. The data requirements will vary with the operating mode of the computer, and the data possibilities with the nature of the monitoring software available for each model and mode. In some centres, methods of capturing additional utilization information may have to be introduced.

The attached tables specify the statistical detail which centres operating in the specified modes should attempt to capture and report commencing with the April-June quarter of 1974. The precise content of each report, and the timing of its introduction, will be discussed with each centre manager by the Information Systems Division of the Secretariat. Appropriate modifications of detail and timing will be permitted to the extent necessitated by the circumstances in each case.

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1. Model Quarterly Utilization Report — Serial Processing Facility

Reporting Centre: Report Period:

Officer to Contact: Telephone No.:

Computer System:

	Units	Prime Shift	Second Shift	Third Shift	Holidays, Weekends	Total
A. Facility Use						
Scheduled hrs. of operation		Hrs.				
Power on and work in progress		Hrs.				
Down time		Hrs.				
Lines printed		No.				
B. Workload Data						
Batch jobs completed		No.				
Average elapsed time/job		Min.				
Average lines printed/job		No.				
C. Special Equipment Use (where applicable)						
Documents/pages read		No.				
COM frames produced		No.				
Plotter time used		Hrs.				
D. Explanatory Notes						

APPENDIX VIII-3

2. Model Quarterly Utilization Report – Multiprogramming Facility

Reporting Centre: Report Period:

Officer to Contact: Telephone No.:

Computer System:

	Units	Prime Shift	Second Shift	Third Shift	Holidays, Weekends	Total
A. Facility Use						
Scheduled hrs. of operation		Hrs.				
Power on and work in progress		Hrs.				
Down time		Hrs.				
Central processor use		CPU Hrs.				
Main core use		K.bitsxHrs.				
Lines printed		No.				
B. Workload Data						
Batch jobs completed		No.				
Average elapsed time/job		Min.				
Average CPU time/job		CPU Min.				
Average core requested/job		K. bits				
Average data transferred (or I/O requests)/job		K. bits				
Average lines printed/job		No.				
C. Special Equipment Use (where applicable)						
Documents/pages read		No.				
COM frames produced		No.				
Plotter time used		Hrs.				
D. Explanatory Notes						

APPENDIX VIII-3

3. Model Quarterly Utilization Report – Time-Sharing Facility

Reporting Centre: Report Period:

Officer to Contact: Telephone No.:

Computer System:

	Units	Prime Shift	Second Shift	Third Shift	Holidays, Weekends	Total
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A. Facility Use

Scheduled hrs. of operation	Hrs.
Power on and work in progress	Hrs.
Down time	Hrs.
Central processor use	CPU Hrs.
Lines printed	No.

B. Workload Data

(a) Batch jobs

Number completed	No.
Av. elapsed time/job	Min.
Av. CPU time/job	CPU Min.
Av. data transferred (or I/O requests)/job	K. bits
Av. lines printed/job	No.

(b) Conversational sessions

Number completed	No.
Av. line connect time	Min.
Average CPU time	CPU Min.

C. Special Equipment Use

(where applicable)

Documents/pages read	No.
COM frames produced	No.
Plotter time used	Hrs.

D. Explanatory Notes

Chapter	IX
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EDP RECORDS MANAGEMENT

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DIRECTIVE

7.1 In accordance with the "Public Records Order", departments shall ensure that:

- (a) suitable retention and disposal schedules for EDP public records are developed and reviewed periodically;
- (b) proposals to destroy EDP public records which are not covered by existing disposal schedules, or to remove EDP public records from the ownership of the Government of Canada, are submitted to the Dominion Archivist;
- (c) EDP public records of continuing value are stored and handled in a suitable manner to protect them from deterioration or destruction while in the department's custody.

GUIDELINES

- 7.2 The departmental records manager, in co-operation with the department's EDP staff, EDP users, and the staff of the Public Archives, should be responsible for ensuring effective records management practices in the development and operation of EDP systems.
- 7.3 EDP records should be regularly reviewed and relevant action taken according to the approved schedules.
- 7.4 Departments and agencies should ensure that there is an adequate written description of the organization and use of all retained machine-readable material, including any necessary references to systems and programming documentation.

A. INTRODUCTION

The use of EDP equipment by the federal government to meet administrative requirements and to support departmental programs has led to the creation of many specialized records in the form of punched cards, printouts, tapes and discs. A variety of service and support activities related to the EDP function also generates many of the more traditional types of records, including letters, forms, reports, manuals and microfilm.

The intent of this chapter is to encourage the effective management of all of these records. The emphasis should be on the integration of EDP records into departmental records management programs, rather than on the creation of a special program specifically for EDP records. An effective EDP records management program requires good internal co-ordination among EDP users, departmental EDP service organizations and the departmental records manager.

Some initial thought is required to determine a realistic approach to the establishment of retention and disposal schedules which properly identify records of lasting importance while considering the needs of specific EDP users, the department and the government generally. The staff of the Public Archives are available to give advice and assistance at any or all stages of the EDP records management program.

B. DEFINITIONS

Public Records are defined as "correspondence, memoranda or other papers, books, maps, plans, photographs, films, microfilms, sound recordings, tapes, computer cards, or other documentary material, regardless of physical form or characteristics, that

- (i) are made or received by any department in pursuance of federal law or in connection with the transaction of public business,
- (ii) are preserved or appropriate for preservation by that department, and
- (iii) contain information on the organization, functions, procedures, policies or activities of that department or other information of past, present or potential value to the Government of Canada,

but does not include library or museum material made or acquired and preserved solely for reference or exhibition purposes, extra copies of records preserved only for convenience of reference, working papers or stocks of publications or printed documents". ("Public Records Order", P.C. 1966-1749, 2 (b)).

EDP public records, for the purpose of this guideline, are those records that

- (i) are specifically created for the use of, or are generated by means of EDP equipment, and
- (ii) are within the overall definition of "public records".

Working papers, consist of rough notes, calculations, punch cards, preliminary drafts, research notes, etc., used in the preparation of other records such as correspondence, reports and statistical tabulations. These become of little or no value once the finished record has been produced, and should be destroyed as soon as the finished product is available in readable form. Working papers relating to the preparation of legislation, however, should be referred to the Public Archives of Canada. ("General Records Disposal Schedules of the Government of Canada", reprinted 1973, p.4).

For further clarification of the definition of a working paper, the reader is referred to definitions of policy, routine, dormant, housekeeping and operational records which appear in the General Records Disposal Schedule.

C. EDP DATA ADMINISTRATION

Within a department's EDP organization, consideration should be given to the design and implementation of a data administration system to assist in the management of machine-readable and related EDP records. Such a system should include:

- standards for systems and program documentation, and for data organization and presentation,
- a data administration sub-system that would include:
 - a description of the organization and use of all data and data files,
 - a cross-reference to the location and extent of systems and programming documentation,
 - information on the required protection of data and associated files, including access, retention and disposal schedules, and the authority to release or dispose of data;
- appropriate systems and procedures.

The data administration system should be premised on the following:

- the responsibilities of users and EDP personnel should be clearly delineated as to the creation, use, destruction or release of data,
- both EDP personnel and users of EDP should become familiar with the principles and objectives of data administration,
- there should be frequent interaction with the departmental records manager to ensure that active, dormant and archival EDP records are handled properly,
- there should be periodic reviews of the data administration system to ensure that quality, accuracy and usefulness are maintained,
- a data administration program as it is developed, should be applied immediately to all new systems work and should be progressively and methodically applied to existing systems, data and documentation.

D. FACTORS REQUIRING CONSIDERATION IN DETERMINING DISPOSAL SCHEDULES

Factors requiring consideration in the determination of EDP records disposal schedules are not greatly different from those for paper records (see reference 4). A significant difference from the point of view of the archivist and the historian is that because machine readable records can be relatively easily sorted

using computer techniques, it is feasible to search through a much greater volume of records, and the practical limits which apply to the volume of paper records which can be studied by historians have been vastly increased for EDP records.

Factors which should be considered in formulating a records disposal schedule include:

- the number of accesses to the records which are likely to be made as a function of time,
- alternative ways in which the required information can be retrieved in the event it is needed,
- the cost of storage, including any special documentation required,
- the potential archival interest in the record.

A written record of the basis on which the disposal schedule was decided should be retained to assist any future re-examination of the schedule.

E. LONG TERM STORAGE OF INFORMATION ON MAGNETIC TAPE

Surprisingly little is known about the ability of magnetic tape to store information satisfactorily over a long period of time. Many data processing centres insist on recopying all taped data after a year of storage, others are successfully retaining data on tape for seven to ten years. Care of the tape is clearly a factor in reliability of data recovery, as is the quality of the tape itself. The ensuing comments are derived primarily from Reference 5.

Recording Density — The 800 bpi recording density using a non-return to zero recording technology is not recommended since it is near the limits of that recording method. The phase encoding method usually associated with 1600 bpi and higher recording densities is thought to be more reliable.

Temperature and Humidity — Temperature and humidity cycling should be avoided. For long term storage, the temperature of the storage area should average between 65° and 70°F, and should be maintained within $\pm 5^{\circ}\text{F}$ limits. Relative humidity should average between 45 and 55%, and be maintained within $\pm 5\%$ limits.

Electromagnetic Radiation Protection — Tapes should be stored at least two feet from any electrical cable or other source of electromagnetic radiation.

Recording — Some tapes are designed specifically for long term storage, and these should be used if available. The tape should have been used successfully previously for between four and fifty full length passes, and no more than five write-skips should be allowed during the write operation. It is of course important that the recording environment be as free of dust as possible, that the

tape be clean, and that the recording heads on the tape unit be properly aligned. After recording, the tape should be rewound carefully with a constant, low tension. If rewound on the tape unit, a slow speed rewind should be used. A tape cleaner-rewinder can also be used.

Other Considerations — The tape should be carefully labelled, and any necessary documentation or information retrieval programs carefully stored. Some users recommend rotating the tape containers or rewinding the tape periodically to help prevent magnetic print through. This practice may be beneficial, but evidence that failure to follow such practices is detrimental is not readily available. There appears to be no clear evidence to favour either plastic or metal canisters over plastic wrap around straps. If a canister is used, it should support the reel from the hub and not let it rest on the flanges.

Until such time as more is known about the behavior of magnetic tapes subjected to long term storage, it is advisable to keep two copies of information of great importance in different locations, and to check the reliability of the recording at one or two year intervals.

F. REFERENCES

1. *The Public Archives Act*, R.S.C. 1970, Chapter P-27.
2. *The Public Records Order*, P.C. 1966-1749, September 9, 1966.
3. *Guidelines on Records Management*, Treasury Board Information Bulletin 1968-2, April 8, 1968.
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GUIDE ON EDP ADMINISTRATION

Chapter	X
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SECURITY IN AN EDP ENVIRONMENT

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DIRECTIVES

- 8.1 General security responsibilities and procedures in the EDP environment will be those stated in the relevant departmental security manuals unless otherwise specified in these directives and guidelines. In cases of conflict, the application of policy and compliance with regulations and procedures will be subject to review by the Security Advisory Committee.
- 8.2 Departments using EDP facilities are responsible for:
 - (a) classifying or categorizing information in accordance with established procedures, and specifying circumstances under which data may be downgraded or declassified,
 - (b) ensuring that all EDP facilities processing classified information, including those under contract to the department, meet minimum security requirements,
 - (c) ensuring that any EDP facilities under their control have adequate physical security protection.
- 8.3 Any EDP facility, either government or private sector, which is engaged in handling government information is responsible for:
 - (a) protecting classified information in its custody, in whatever form, to the level required by the security classification and any accompanying caveats,
 - (b) ensuring that an up-to-date security evaluation report outlining the security precautions and regulations and describing possible security risks of which account has been taken, is available to the Security Evaluation and Inspection Team (unless specifically exempted by the Security Advisory Committee).
- 8.4 The Security Services Branch of the Department of Supply and Services is responsible for arranging security clearance for private sector facilities and personnel. Upon request to the Security Services Branch of DSS by any government department which has or contemplates having contracts involving classified information at a private sector EDP facility, the Security Evaluation and Inspection Team will inspect the facility and provide an evaluation report and recommendation to the department(s) concerned and DSS. An evaluation report will also be made available to the president of the private sector facility or his nominee.
- 8.5 The processing of classified information requires that special consideration be given to the selection, location, housing and installation of EDP equipment. Any organization planning the establishment, modification or relocation of a general purpose EDP facility which will or may be processing classified government information must contact the Departmental Security Officer (DSO) during the planning phase. The DSO will in turn ensure that the appropriate security experts are consulted.

GUIDELINES

- 8.6 All EDP centre directors should appoint an EDP security co-ordinator, who will receive direction from the departmental security officer on security policy and report to the EDP centre director on matters affecting EDP security. The security co-ordinator should be a senior member of the centre staff experienced in the EDP field whose normal responsibilities require an understanding of EDP centre operations from both a management and a systems point of view. This individual should also have a general knowledge or awareness of security principles, procedures and problems.
- 8.7 The responsibilities of the security co-ordinator should include:
 - (a) initiating security threat evaluations,
 - (b) development of EDP centre security procedures, proposals for threat countermeasures, and recovery systems,
 - (c) periodic checks of the centre's security precautions and recovery and back-up systems,
 - (d) alerting the centre director to potential security problems,
 - (e) education and motivation of centre personnel to observe security precautions.
- In some centres it may be helpful to divide the planning and administrative functions between two individuals.
- 8.8 The high potential cost of EDP security requires that a realistic evaluation be made of the potential threat and the available countermeasures. This evaluation should be updated at annual intervals (or more frequently if occasion demands) and should provide the basis for any modifications or additions to security measures at the EDP centre.
- 8.9 All security criteria pertinent to an EDP job intended to be contracted should be included in the invitation to tender. Bidders should be evaluated on their responsiveness to security requirements.
- 8.10 The originator of the data to be processed should determine and clearly indicate the security classification of those data. The marking of computer output is the joint responsibility of the originator and the EDP facility. The originator should ensure that those responsible at the EDP facility are aware of the classified nature of the output. The EDP facility manager is responsible for the labelling and protection of the computer output as instructed by the originator.

- 8.11 Control measures for data handling and program modification, including authentication and auditing systems, locks and passwords, should be clearly identified in the standard operating procedures of the EDP facility.
- 8.12 The interconnection of EDP facilities and telecommunications services should be carefully planned and co-ordinated to ensure that the integrity and security of the information being processed and transmitted is protected.

A. INTRODUCTION

Impenetrable security is generally thought to be unattainable. An optimum security system is one in which the cost of providing the security against a given threat in a given time period has been balanced against the probability of the occurrence of the security infraction and the cost to the government if the security infraction occurs. This kind of balance should be achieved for all the differing threats to which information, personnel or property can be subjected.

In most situations, particularly those in which governments find themselves, it is extremely difficult to determine either the probability of occurrence of a given threat, or the cost involved if the threat becomes an accomplished fact. Nonetheless, the importance of evaluating the possible threats and their impact *before* deciding on the security measures which are appropriate in any particular EDP environment can not be overemphasized. In most cases it is possible to evaluate both the expected frequency of occurrence and the cost associated with any defined threat to an accuracy of a factor of ten. This will at the very least provide guidance on the appropriate emphasis of the security system.

Security threats are greatly dependent on the type of information being handled. Information which is being sought by a foreign power clearly warrants different protective measures from information which may be sought by a private citizen about a neighbour. This chapter by and large addresses the problem of minimum security standards. In this respect, it should be pointed out that some departments, such as DND, External Affairs and the RCM Police need to impose more stringent rules than others.

Security tends to be a subject in which managers show real interest only when a breach has occurred. It must be obvious though, that an EDP manager is not properly fulfilling his duties if he does not:

- ensure that a proper threat evaluation is carried out and periodically updated, and assure himself that the evaluation is realistic;
- take steps to provide reasonable countermeasures to the threats; and
- assure himself that his staff are continually aware of and follow established security procedures.

This chapter is intended to assist those with a responsibility for the planning of security and the development of security procedures in an EDP environment. Many aspects of security in an EDP environment are common to security in other environments. For these aspects established procedures and practices generally exist already, and such aspects are only briefly mentioned as guidance is readily available from departmental security officers and government agencies with specific security responsibilities.

This chapter, with its directives and guidelines, was prepared with the assistance and concurrence of the Security Advisory Committee. It applies to agencies named in Schedule C of the Financial Administration Act, as well as to agencies named in Schedules A and B, and to branches designated as departments.

B. RESPONSIBILITIES

The arrangements the centre director makes for the administration of security will, of course, be dependent on the size and nature of the operation. Two distinct types of security related activities can be isolated. In larger centres, it is anticipated that these two types of activities will be undertaken by different people, in many cases in conjunction with other duties. The two types of activities can be loosely described as security co-ordination and security administration.

Security co-ordination embraces the activities of threat evaluation, security system design including development of security procedures, back-up and recovery methods, and liaison on these subjects with departmental management and security specialists. The person undertaking these activities will normally have a thorough working knowledge of the computer system and the operations of the centre.

Security administration embraces such day to day activities as ensuring that appropriate security clearances are obtained, badges and passes are kept up-to-date and most important, that security regulations are understood and observed. Included in these activities is the continuing education of centre employees in the requirement for security and the regulations that result. These tasks would normally be undertaken in co-operation with the departmental security officer and centre management. The person undertaking these activities should be conversant with the operations of the centre.

Many of the security responsibilities indicated below are not specific to EDP, but they are listed here for the convenience of the reader.

1. Deputy Ministers and Heads of Agencies

Deputy Ministers and Heads of Agencies are solely responsible for the implementation and administration, within their department or agency, of government security policies and procedures as set out in References 1 and 2. This includes responsibility for determining the level of security required by EDP services employed to process the work of their departments and agencies.

2. Departmental Security Officers (DSO)

The Departmental Security Officer is responsible to the deputy minister or head of agency, for ensuring the implementation, co-ordination, supervision and audit of *all* security policies, standards and procedures, including EDP, which affect his department.

3. Security Advisory Committee (SAC)

The Security Advisory Committee is an interdepartmental advisory body which provided advice on security matters during the formulation of these guidelines. This committee will continue to provide advice, counsel and guidance for the resolution of conflicts between departmental and security interests.

4. R.C.M. Police

The Commissioner, R.C.M. Police, is responsible for advising deputy ministers and heads of agencies on the implementation of government security policies as outlined in directives, regulations and instructions, consistent with responsibilities allocated in these directives and guidelines. He may obtain assistance for certain aspects of this responsibility from other departments and agencies within government as mutually agreed upon.

The Commissioner, R.C.M. Police, will be responsible for the organization and operations of the Security Evaluation and Inspection Team (SEIT).

5. Department of Supply and Services

The Department of Supply and Services is responsible for the supply of, and contractual agreements for, all EDP equipment to be used by government departments and agencies. This includes ensuring, whenever possible, that suppliers of equipment have incorporated into the manufacture and design of any equipment, all security specifications as established by government security regulations and guidelines. DSS is also responsible for arranging for the security clearance of private sector facilities and personnel.

6. Department of Communications (DOC)

The Department of Communications is generally responsible for ensuring that the interconnection of EDP facilities and telecommunications services will:

- satisfy security requirements,
- satisfy the user's need to communicate,
- protect the integrity of the communications system,
- provide continuity of operations,
- comply with pertinent government policies, regulations and guidelines.

DOC's responsibilities do not extend to External Affairs, National Defence and the RCMP.

7. Department of Public Works

Whenever the Department of Public Works is responsible for the construction of or for structural changes to a building, it is also responsible for implementing structural requirements dictated by security standards. This includes application of the federal, provincial or municipal building codes and fire regulations and counselling as to their effect on security requirements.

8. The EDP Security Evaluation and Inspection Team

The Security Evaluation and Inspection Team (SEIT) is responsible for the regular inspection of EDP facilities within the government as well as private sector facilities processing classified information.

A committee established by the Security Advisory Committee is responsible for reviewing and advising on the activities of SEIT.

C. THREAT EVALUATION

Security measures applied to EDP installations can be costly. It is of prime importance that a realistic evaluation be made of the potential threat, as well as of the possible methods of countering the threat, to ensure cost effective application of security factors. Threat assessment will require the active participation of departmental management, people with a good grounding in EDP and security, and, in appropriate circumstances, auditors.

Insofar as EDP is concerned, security threats are directed either against EDP equipment or materials or against information stored at the facility. For the purposes of this chapter, it is convenient to categorize the security threats as follows:

- accidental destruction,
- accidental modification,
- accidental disclosure,
- intentional destruction,
- intentional modification,
- intentional disclosure.

Sources of threat are too numerous to mention. It has been estimated by IBM that errors and omissions account for well over 50% of security problems. Dishonest employees, fire, disgruntled employees and water follow in descending order of occurrence. In most cases the threat from outside interference is relatively small, though there are obvious exceptions to this general observation. The unauthorized use of EDP resources by employees (or former employees) has been a problem in the private sector, and should be considered when formulating security precautions for government centres.

The threat of compromise of Government classified information can not normally be evaluated in terms of dollars. The importance to the nation of the information is expressed in the classification assigned and all classified information must be protected to the full extent of the regulations. In determining the

priorities of expenditure on security in such circumstances, it is necessary to assess the threats and the cost of providing countermeasures. In such circumstances dollar cost impact assessments are of little assistance.

Where national security is not at stake, it will usually be helpful to assess both the dollar impact of a security breach and its expected frequency of occurrence. Because of the obvious difficulty in making accurate estimates, this should normally be attempted to an accuracy of powers of ten only.

Once this has been done, it is possible to assess a "cost exposure" of each threat, where the cost exposure normally expressed in dollars per year is defined as the product of the approximate cost of a given security breach and the expected frequency of its occurrence. The cost exposure should include the cost of reconstructing any lost or destroyed information necessary to future operations.

For example, the odds of a computer being totally destroyed by fire may be assessed at once in a hundred years, and the value of the equipment lost at one million dollars. In this case the cost exposure would be $1/100 \times \$1,000,000$ which equals \$10,000 per annum.

At the other extreme, the rate of error insertion to records in a large data base may be about 40 per day (or about 10,000 per year), and the average cost of recovering from the error may be \$10. In this case, the cost exposure would be $(10,000 \times \$10)$ equals \$100,000 p.a. This rough numerical exercise should be carried out for significant data files, software and equipment for the six categories of threat which have been listed. In order to minimize frustration, *it is important not to attempt more than order of magnitude estimates of cost impact and frequency of occurrence of the various threats.* The calculation should be used only to indicate areas where security efforts should be concentrated. An accurate cost exposure estimate is not necessary even if it is achievable. Some sample threat evaluation calculations are shown in Appendix X-1.

Once the cost exposure of various threats to various files and equipment has been evaluated, an overall assessment needs to be undertaken of ways to reduce the total cost exposure. It is obvious that this must be achieved either by reducing the expected frequency of occurrence of the threat, or by reducing its cost impact (or both).

D. SECURITY MEASURES

Appropriate security measures may vary widely depending on the perceived threat. This section is by no means comprehensive. It is intended only to provide useful reminders of some approaches which may be useful to the design of a security system.

1. Physical Security

All EDP facilities are required to meet mandatory minimum criteria as specified in References 1 and 5 and relevant building codes to provide protection from potential natural or man-made disaster and to ensure security commensurate with the protective levels required for the classification of the data processed.

Minimum criteria related to construction and fire separation are contained in the National Building Code of Canada, and in particular in the Dominion Fire Commissioner's Fire Protection Engineering Standard No. 310 (Reference 5).

The complement of physical security measures should be determined in consultation with the departmental security officer (or DSS - Security Services Branch for private sector facilities). The following factors should be borne in mind:

a. Fire protection

Smoke rather than temperature sensitive detectors are most likely to be effective. Delayed quenching systems which allow time for human intervention (with hand held extinguishers) should be considered. If a CO₂ extinguisher system is used, some provision to protect personnel from suffocation will be required. Inflammable computer supplies should be stored in a separate fireproof room. The Dominion Fire Commissioner should be consulted before deciding on the appropriate fire protection system for significant new installations.

b. Protection against water damage

Below ground sites should be avoided unless they are on a slope providing good natural drainage. If a below ground site is chosen provision of emergency pumps (and power for them) should be considered.

Plastic sheeting should be conveniently available to cover equipment in the event that water should leak through the ceiling as a result of a fire on an upper floor, a burst pipe, etc.

c. Shielding

The strength of a magnetic field falls off rapidly with distance from the source. Experience indicates that a large permanent magnet will have no measurable effect on a disk or tape held 20 inches away. Therefore reasonable protection of tape libraries, etc. can be obtained by ensuring that magnets can not get within two or three feet.

Strong radar signals (line of sight from a ground based radar) have been known to cause interference in computer operations, but only if the signal is of the order of 5 volts/metre beside the equipment. In such circumstances shielding is required if the computer can not be relocated.

Other electrical and electronic equipment can also be sources of interference with the computer. In general, the computer is most susceptible to interference from sources radiating at the clock frequency (usually over 1 mH) of the central processor or low order multiples of it. If there is a possibility of interference from equipment to be located near the computer, the computer manufacturer should be consulted regarding the sensitivity of his equipment.

Electrical interference is most likely to be conducted to the equipment through power cables. The equipment manufacturer should be consulted concerning any line filters which may be required.

Radiation and radioactive particles are generally not a threat except to unexposed microfilm in some circumstances.

2. Physical Access

Access to computer equipment and libraries should be restricted to persons essential to the operation. There are a variety of ways by which access can be controlled. The system chosen should be adaptable to both prime shift and off-prime use. The RCM Police will provide information on approved access control devices on request. Where classified information is involved, only RCM Police approved devices may be used.

The key element to effective access control is the physical presence of someone by the door to the restricted area who can control access and who is instructed in the appropriate action to take in abnormal situations. Such a person may, but need not necessarily be, a full time guard except where military or other provisions require it. The RCM Police will provide advice and information on approved intrusion alarm systems.

3. Electronic Vulnerability

Classified information being processed or transmitted in the form of an electrical signal is vulnerable to compromise by such surreptitious activities as:

- incorporating detection devices within the computer equipment,
- wiretapping,
- monitoring cross talk,
- detection of radiated emissions.

Bugging and wiretapping can occur at any point in the system where entrance can be obtained to processing modules or interconnecting cables. Equipment for such purposes is readily available and easy to apply.

Cross talk is the generation of signals in one wire due to electro-magnetic induction from signals in a neighbouring wire. These induced signals are copies of the original signal and, under suitable circumstances, can be read at a considerable distance. Similarly electronic devices generate electro-magnetic radiation which can also be detected at considerable distances and made to reveal the information being processed. As may be expected, it is generally rather difficult to decipher signals emanating from a central processing unit. However, deciphering of signals to or from peripherals, particularly those employing high voltages and receiving or sending information in a serial (as opposed to a parallel) stream of pulses can be relatively easy.

Multi-user systems utilizing remote access present special security vulnerabilities. The greatest communications-electronics security hazard to the multi-access system is the interconnecting communications system. Areas of threat within the communications system include the remote terminals themselves, any switching centres involved, and the interconnecting circuits. These areas provide targets to which electronic bugs or electro-magnetic radiation detectors may be applied. They are also susceptible to hardware failure (accidental or intentional)

which could result in a loss of information and a compromise of security or integrity of the system. EDP facilities processing classified information are subject to special constraints within the discipline known as Communications-Electronics Security (COMSEC).

Because many aspects of COMSEC can only be discussed in classified terms, guidelines on COMSEC have been consolidated in a supporting paper (Reference 3). Persons with the need to know may obtain copies through their Departmental Security Officer.

It is Canadian policy that all classified information transmitted by electro-mechanical or electronic systems be afforded suitable cryptographic protection. It should be noted that some departments, such as the Department of National Defence, the Department of External Affairs, and the Royal Canadian Mounted Police will be required to impose more stringent rules than others governing the encryption of unclassified information. Plans to use encrypted transmission to protect the security of information should be discussed with the Departmental Security Officer who will contact the appropriate authorities. For planning purposes, it should be noted that normally approximately two years is required as lead time for the acquisition of cryptographic devices. The Departmental Security Officer will also be able to advise on the use of commercial security equipment which may be more readily available.

4. The Processing Environment

At this time, manufacturer-supplied multiprogramming, remote entry and time sharing systems do not by themselves provide sufficient protection from either deliberate or accidental unauthorized entry to data and programs to permit concurrent processing of classified and unclassified information. For the purposes of this chapter it is convenient to define two types of processing environment (and several different modes of operating within these environments) under which classified processing will be considered. Classified processing should be allowed only on computer systems which are judged to be secure by the departmental security authority (as recommended by the SEIT).

a. Environments

A *closed environment* consists of a computer system in which *all* users granted access to system resources are security cleared to the level of the most highly classified information processed within the system, and access to system resources is accomplished either on site or from secure remote terminals via remote links equipped with approved encryption devices.

An *open environment* consists of a computer system that users access either on site or by means of remote facilities which may or may not be secure.

b. Processing modes

There are a number of standard computer terms which describe various processing modes; e.g., batch mode, local and remote multiprogramming modes, and local and remote time-sharing modes. Unfortunately, degrees of security can not easily be categorized according to these modes. For the purposes of this chapter, the following "secure modes" have been defined.

Mode 1 in which either an individual job or the jobs of a single user are processed and completed before the next job or user begins. Information up to and including TOP SECRET may be processed in Mode 1.

Mode 2 in which a number of users are concurrently processing their jobs, but in which all jobs are classified to the same level. Information up to and including SECRET may be processed. In some circumstances, with the approval of the Departmental Security Officer, TOP SECRET information may be processed in this mode.

Mode 3 in which several users (all cleared to the highest level of data being processed on the system) are concurrently processing jobs at several levels of sensitivity. Information up to and including SECRET may be processed in Mode 3, except that unclassified and SECRET data may not be processed concurrently.

c. Processing considerations

All three modes are possible in either a closed or an open environment. However, for installations operating in an open environment, classified data processing should be restricted to a dedicated period during which only adequately cleared users are permitted access and *all* non-secure remote facilities and links are disconnected. A non-secure installation should not process classified information at any level unless authorized to do so by the Departmental Security Officer in special circumstances.

Because of the high cost of providing appropriate protection, all reasonable effort should be made to co-ordinate TOP SECRET data processing applications, and to segregate them from applications requiring a lower security classification.

In any environment it is important that steps be taken to preserve the integrity of each program in the computer by preventing interference between program areas in the core and ensuring that computer input and output are rigidly controlled and afforded prescribed physical protection. Some useful measures, which should be considered include:

- an authentication system based upon terminal and correct file or program identification;
- program and/or file protection and access control through a system of locking passwords;

- file protection by controlled programming in controlled remote access conditions;
- a continuing system of security checks including audit trails and audits of operating and applications programs, operating procedures and systems.

The importance of audit trails which are regularly inspected can not be overemphasized. When properly implemented and regularly analyzed they provide a quick indication of abnormal behaviour — often the only visible clue to a security violation, as well as providing valuable operational information to assist in the efficient running of the computer system. Audit trails can be particularly useful in tracing fraudulent activities, including unauthorized use of the computer for commercial or other purposes.

Secure routes should be established for data preparation, programming and operating areas through which all classified material passes. The material should be accounted for at each stage of processing.

A feature to erase all program and associated data from the computer memory and non-permanent magnetic storage should be activated before that memory or storage is released for use by another job. Core memory dump routines should restrict dumps of core contents to those portions of core that were utilized by an aborted job except under carefully controlled conditions.

All processing requisitions should be recorded in a register or log by job or file number, originator or owner's identification, reference or number, time, date, and classification. A control point should be established to register and record all classified data processing and transmission activities.

5. Security of Personnel

The Government of Canada requires that every person be security cleared to the appropriate degree before being allowed access to classified information. No person is entitled solely by virtue of rank or position to have access to, knowledge of, or custody of, classified information.

Industrial security agreements and arrangements require the security clearance of personnel within the private sector engaged on classified Government contracts.

Within the EDP environment, individuals are responsible for the protection of classified matter in accordance with prescribed rules and regulations, and management is responsible for ensuring that persons employed in EDP are security cleared to a level commensurate with their specific duties and the highest classification of matter to which they may have access. It is within the deputy head's prerogative to require at least a minimum level of security clearance for all EDP personnel, even where classified material is not expected to be handled (see Reference 1).

The security clearance and reliability of all persons employed in the EDP environment should be established through normal clearance procedures.

6. Safety of Personnel

Security planning must take account of the safety of personnel in the EDP area, as well as of the security of data and equipment. Plans must provide for the safe evacuation of personnel in the event of fire or other emergencies, while still maintaining data security. Emergency lights should be provided where required, and evacuation routes kept clear of obstructions of all types. Alternative means of exit are essential where power-operated doors are normally in use. All personnel should be thoroughly familiar with and drilled in emergency evacuation procedures, and clearly instructed as to their responsibilities for data security and for providing assistance to others. A proper concern for this aspect of security is likely to create much more positive attitudes towards other security rules and procedures.

7. Marking of Classified Material

All classified material must be clearly marked with its classification, and (where practical) colour-coded. It is recommended that the following procedures be employed to mark the assigned classification:

- hard copy computer printouts and forms, papers, books, etc. from which EDP data are collected, are usually standard paper documents and the security classification should be stamped or typed at the centre top and bottom of each page.
- punch card decks and their containers should bear an indication of their security classification by a physical marking.
- punched paper tape and spools should be marked with the classification on the spool and/or at the beginning and end of the tape.
- magnetic tape and disk packs should be marked with the classification in plain language on the reel of magnetic tapes or on the spindle of disk packs, and on the outside of their containers. The markings should be labels which are not easily transferred or destroyed.

8. Declassification, Disposal or Destruction of Classified Material

The following procedures have been developed as minimal prerequisites to the release, deployment or destruction of storage media. EDP staff should be aware that the erasure procedures recommended are adequate to thwart known data reconstruction methods; however, it is not possible to guarantee that magnetic storage media so erased are absolutely unreadable. Thus, magnetic storage media, particularly those which have once been classified SECRET or above, should remain in a secure environment even after erasure in accordance with an accepted procedure, unless practical necessity dictates otherwise.

a. Internal re-use

Magnetic tapes, disks, drums and similar storage devices which have been used to process classified information, can be freed for re-use within the EDP facility following a single overwrite at normal recording current level. The device and its container should be labelled with the security classification of the most sensitive material ever recorded thereon.

Internal computer core memory should be erased using the normal erasure method at the end of each computer run. After exceptionally sensitive runs, it may be advisable to use the erasure method described for declassification of core memory (see c, below).

b. Tape reclassification

When tapes which have been used to process classified information are to leave the EDP facility they should be erased with a bulk tape degausser approved by the RCM Police and inspected at prescribed intervals.

Because the write head of a magnetic tape unit is unlikely to align perfectly with the "information tracks" of the tape, residual information may be left on the tape when tape erasure by overwriting is attempted. For this reason, it is important that a bulk tape degaussing, rather than simple erasure using the tape unit, be used to declassify tapes.

Tapes which have once contained TOP SECRET information should not be declassified in any circumstances.

c. Declassification of disks, drums and other storage devices

In general, disks and drums should retain their highest security classification throughout their useful life. However, drums and disks (both fixed-head and removable) which have contained material up to the SECRET level may be declassified by overwriting the disk at least four times with random numbers.

In the event that disks and drums become unserviceable so that this method can not be used, the disk or drum can be erased by subjecting it to a field strength of 1,500 oersteds. This can be done best by covering the disk or drum with a 5-mil. plastic sheet and passing a permanent magnet of appropriate strength over the sheet.

Magnetic core memory which is to be removed from a secure area should be overwritten at least four times with random numbers.

For cases where these procedures are not practical (due to equipment malfunction for example) or where magnetic storage media other than those mentioned above are involved, the departmental EDP security officer (or, in the case of private contractors, the Security Services Branch of DSS) should be consulted.

Disks, drums, magnetic core memory and other storage devices which have once contained TOP SECRET information should not be declassified except under special conditions approved by the Departmental Security Officer.

d. Destruction of EDP material

The destruction of classified material should be performed under the supervision of persons security cleared to at least the same level as the most highly classified matter contained in the material, who should ensure that classified information contained therein can not be recovered or reconstructed by unauthorized persons.

Specific methods for destruction include:

- Magnetic tapes — subjection to a temperature of 1,000°F (540°C) for at least ten minutes. The residue should be pulverized.
- Microfilm/microfiche — burning.
- Punch cards — burning, shredding or pulping to standards specified in departmental security orders.

Espionage is not confined solely to classified or sensitive information; the collection of routine, apparently harmless, unclassified information stored, manipulated and processed within EDP systems, when collated can produce a significant yield. Even though the programs and data files may be in machine readable form, they are still vulnerable; accordingly EDP printout and machine records should be disposed of under controlled conditions.

9. Back-Up

Back-up is an important element in any security program. The ability to recover provides protection against a wide variety of hazards, including many which can not be anticipated or prevented. Differing EDP operations in general have differing back-up requirements. The security evaluation should consider the costs and likely benefits of:

- on-site equipment back-up (processor and/or peripheral duplication, emergency power, air conditioning, etc.),
- off-site equipment back-up (off-site facilities which are regularly tested for compatibility),
- data and program back-up (spare copies of data and programs and any required documentation properly maintained and tested in a safe location.).

E. INSPECTION AND EVALUATION

The Security Evaluation and Inspection Team (SEIT) is responsible for the regular inspection of EDP facilities processing classified information. After inspection of a centre, the team will prepare a report for the Deputy Head in

charge of the centre recommending and justifying improvements to the security of the centre, and indicating the level of classification of information which the centre can safely handle. In the case of private sector EDP installations an evaluation report will go to the Director of the Security Services Branch of DSS and the president of the company or to a responsible officer delegated by the president. In all cases, copies of the inspection report will be provided to the EDP centre manager and the chairman of the Security Advisory Committee. An accurate log book should be kept of all system changes at EDP installations processing classified information. Any significant changes should be discussed with the Departmental Security Officer prior to implementation.

F. REFERENCES

Those with a need to know can obtain copies of the classified references through the Departmental Security Officer.

1. *Security of Information in the Public Service of Canada*, (Confidential), Office of the Privy Council, November, 1956.
2. *Official Secrets Act* (R.S.C. 1970, Chapter 0-3).
3. *Communications – Electronic Security in Data Processing* (Confidential).
4. *Procedures Under United States – Canada Industrial Security Agreement*, available from DSS – Security Services Branch.
5. *Fire Protection Engineering Standard No. 310*, Dominion Fire Commissioner.

SAMPLE THREAT EVALUATION USING COST EXPOSURE ANALYSIS**INTRODUCTION**

This appendix is included for illustrative purposes only, and is highly imaginary in nature. It is included only to give a rough idea of what is implied by a cost exposure analysis.

Unfortunately it is not possible to proceed from a cost exposure analysis directly to a determination of how much money should be spent on security measures, and of how the money should be spent. A cost exposure analysis does however force an orderly examination of the threats, while at the same time giving a quantitative estimate of the risks associated with each threat. Management will then have to balance the cost of the various security measures against other demands on resources.

Scenario — The Startreck Computer Center has purchased equipment valued at \$4,000,000. The total system can be replaced within three months in case of emergency, and individual components can normally be replaced in less than two weeks. The computer centre is in the basement of the Astral Building, and processes the following major files:

- Personnel files on all employees (Confidential).
- Personnel location files (Top Secret) (giving the present location of all personnel at any point in time).
- Accounts payable and receivable files.

The threat evaluation will be carried out for the six categories of threat mentioned in Chapter X, i.e., accidental destruction, accidental modification, accidental disclosure, intentional destruction, intentional modification and intentional disclosure.

A. Threat Evaluation – Equipment**1. Accidental Destruction****(a) Fire**

Frequency — once in ten years

Cost impact — \$1,000,000

Cost exposure — $(1/10) \times \$1,000,000 = \underline{\underline{\$100,000}}$ p.a.

NOTE: Installation of a Halon fire extinguisher system should limit damage to \$500,000. Cost of resulting dislocation, etc. could cost \$300,000.

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(b) Water — Burst Pipes

Frequency — once in ten years

Cost impact — \$100,000

Cost exposure — $(1/10) \times \$100,000 = \underline{\$10,000}$ p.a.

NOTE: Water pipes are located above equipment and cement ceiling has holes for telephone lines, etc. permitting leakage from floor above. Provision of plastic sheeting to cover equipment in case of leakage, with appropriate instructions to staff, would reduce cost exposure by factor of 10. (Cost of plastic sheeting and holding racks — \$20.)

(c) Water — Flooding

Frequency — once in a hundred years

Cost impact — \$10,000,000

Cost exposure — $(1/100) \times \$10,000,000 = \underline{\$100,000}$ p.a.

NOTE: Basement liable to flooding if power failure accompanies water inundation since sump pump is electrically driven. Any major water line breakage could flood basement and disable power switches located in basement. Cost exposure from this threat could become negligible if the computer were relocated.

(d) Disaster — Earthquake, Aircrash, etc.

Frequency — 1/1,000

Cost impact — \$10,000,000

Cost exposure — \$10,000 p.a.

2. Accidental Modification — not applicable.

3. Accidental Disclosure — not applicable.

4. Intentional Destruction.

(a) Disgruntled employee

Frequency — 1/10

Cost impact — \$1,000,000

Cost exposure — \$100,000 p.a.

NOTE: Exposure can be reduced to \$10,000 by the following measures:

1. Restrict access to 30 employees (in lieu of present 100 employees).

2. Ensure that at least two employees are at the site at all times.

3. Locate receptionist/guard by computer room door.

(b) Demonstrators

Frequency – 1/100

Cost impact – \$10,000,000

Cost exposure – \$100,000 p.a.

NOTE: Exposure would be greatly reduced by removal of computer from Headquarters Building.

(c) Guerilla Action

Frequency – 1/100

Cost impact – \$10,000,000

Cost exposure – \$100,000 p.a.

NOTE: Exposure could be greatly reduced by

1. Removal of computer from Headquarters Building.
2. Transferring Top Secret files and data processing to Centaur C facilities which have maximum security precautions.

(d) War

Frequency – 1/100

Cost impact – \$10,000,000

Cost exposure – \$100,000 p.a.

NOTE: Exposure would be greatly reduced by steps listed in note to (c) above.

5. (a) Intentional Modification – Theft of services

Frequency – once a year

Cost impact – \$10,000

Cost exposure – \$10,000 p.a.

NOTE: Under current operating procedures it is not difficult for a computer room employee to modify the accounting software so as to be able to use the computer to process jobs for outside agencies and to collect a fee for this. A directive should be circulated to employees pointing out the illegality of this, and regular checks of jobs processed should be instigated. These measures should reduce exposure to negligible proportions. The audit trail routine should be amended to ensure that all jobs are correctly recorded.

(b) Intentional Modification – Theft of information by attachment of foreign devices

Frequency – 1/10 (provided recommendations in note to 4(a) above are followed)

Cost impact – \$1,000,000

Cost exposure – \$100,000 p.a.

APPENDIX X-1

NOTE: If the computer were to be moved experts should be consulted with a view to reducing exposure resulting from wire taps, etc. The security of the monitor and communications software should also be investigated.

6. Intentional disclosure — not applicable.

B. Threat Evaluation — Personnel Files

1. Accidental Destruction

Frequency — 1/100

Cost impact — \$100,000

Cost exposure — \$1,000 p.a.

NOTE: Duplicate tapes are stored in a vault on Mars and replaced on a monthly update basis. *In extremis* file can be recreated from paper records maintained at twenty branch offices.

2. Accidental Modification

Frequency — once a day

Cost impact — \$15 per record corrected

Cost exposure — \$10,000 p.a. (rounded to nearest factor of ten)

NOTE: Most errors introduced are of no importance. Tighter control procedures could reduce exposure to accidental modification by a factor of 5 or 10.

3. Accidental Disclosure

Frequency — 1/100

Cost impact — \$1,000,000

Cost exposure — \$10,000 p.a.

NOTE: Cost impact due primarily to embarrassment and employee annoyance. Disclosure could result in strike. Steps recommended under item 6 below would reduce cost exposure here by almost a factor of ten.

4. Intentional Destruction

Frequency — 1/100

Cost impact — \$1,000,000

Cost exposure — \$1,000 p.a.

NOTE: See note under Item 1. Critical period is copying of tape master and its transmittal to Mars. A study of copying options should be undertaken on a low priority basis.

5. Intentional Modification

Frequency — 1/10

Cost impact — \$1,000,000

Cost exposure — \$100,000 p.a.

NOTE: By modifying personnel files an employee could alter his career path to get himself moved to sensitive areas of operations. It is recommended that a check with the original paper record filed by the employee always be undertaken prior to shifting an employee to a new position. A second threat is the use of the personnel files as a vehicle for instituting a fraudulent payroll. It is recommended that a check program which compares previous payrolls to the current payroll and outputs the difference be instituted within the next year. Divisional directors and their supervisors should receive the relevant payroll lists once a year for checking purposes. Possible additional checks should be discussed with the internal auditors and computer experts.

6. Intentional Disclosure

Frequency — 1/100

Cost impact — \$1,000,000

Cost exposure — \$10,000 p.a.

NOTE: Intentional disclosure could be used as a vehicle to disrupt employer — employee relations. List of employees also has commercial value as a mailing list estimated at \$1.00 per name or \$50,000. Program should be altered to restrict printouts to twenty records at any single terminal in a one-hour period. Audit trails of all printouts should be maintained and inspected daily. The procedures manual for use of the data base should be reviewed and updated.

C. Threat Evaluation — Personnel Location Files (Top Secret)

1-5 Accidental Destruction, etc.

not evaluated because of 6, below

6. Intentional Disclosure

Frequency — 1/10

Cost impact — \$1,000,000,000

Cost exposure — \$100,000,000 p.a.

NOTE: The value of these files to alien governments is so great as to make the processing of this information at the Startreck Computer Centre inadvisable. This operation should be moved immediately to the maximum security processor on Centaur C. Transmission of data to headquarters must be via cryptographic communications channels.

D. Threat Evaluation — Accounts Payable and Receivable Files

1. Accidental Destruction

Frequency — once a year

Cost impact — \$500

Cost exposure — \$1,000 p.a. (rounded to nearest factor of ten)

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NOTE: Unreliable disk units make disks containing information periodically unreadable. Use of periodic dumps to tape makes recovery relatively easy. Copy of daily update tape and master tape is maintained in tape vault in Warehouse C251.

2. Accidental Modification

Frequency — once a month

Cost impact — \$200

Cost exposure — \$1,000 p.a. (rounded to nearest factor of ten)

NOTE: Recording errors are picked up through detailed cross checking procedures at month end.

3. Accidental Disclosure

Frequency — (a) 1/100 (for a complete monthly listing)
(b) 10 times a day for individual items

Cost impact — (a) \$100,000 (b) \$10

Cost exposure — (a) \$1,000 p.a. (b) \$0 p.a.

NOTE: Although most accounts payable and receivable items are open to public inspection, alien governments could use a knowledge of defence acquisitions to their advantage. It is recommended that all defence coded acquisitions be separated and treated as confidential when listed in aggregations valued at over \$100,000.

4. (a) Intentional Destruction — total records

Frequency — 1/10,000

Cost impact — \$10,000,000

Cost exposure — \$1,000 p.a.

NOTE: Given copying procedures, total destruction would require simultaneous destruction of two protected tape vaults. Only a disgruntled employee is likely to be adequately motivated. Regular checks on tape copies sent to remote storage ensure that genuine copies have been sent.

(b) Intentional Destruction — individual records

Frequency — 1/10

Cost impact — \$1,000,000

Cost exposure — \$100,000 p.a.

NOTE: There is a significant possibility for fraud through intentional destruction or modification of records. A thorough audit of control procedures should be conducted by a team of management, computer experts and auditors. Particular attention should be paid to possible alteration during reruns, and introduction of new branch points in the computer programs.

5. Intentional Modification

Cost exposure – \$100,000 p.a.

NOTE: See note to 4(b) above.

6. Intentional Disclosure

Frequency – 1/10

Cost impact – \$100,000

Cost exposure – \$10,000 p.a.

NOTE: Note under Item 3 on accidental Disclosure is applicable here.

EDP SECURITY CHECKLIST

As with any checklist, the security checklist which follows is intended to provide a helpful reminder for those involved with EDP security. All items on the checklist will not be applicable to any single installation or group, nor is the list comprehensive.

Threat Evaluation

1. Have you compiled an inventory of the potential hazards facing your installation?
2. Do you know the likelihood of the occurrence of each of these hazards?
3. Do you have an estimate of the potential dollar losses resulting from the occurrence of each type of hazard?
4. Do you know the estimated cost of recreating your current data files and documentation if they were destroyed or damaged?
5. Have you performed an analysis of costs versus benefits to determine the magnitude of the potential loss and the cost of preventive action?

Emergency Plans

6. What plans do you have and what procedures have you established in the event of fire, flooding, bomb threat, unauthorized intrusion, loss or compromise of classified information?
7. Do you have a procedures manual documenting:
 - emergency procedures for shutting down computer equipment, air conditioning, electricity, gas and water,
 - instructions for closing fire doors, locking cabinets, using fire extinguishers, and evacuating the building,
 - procedures for handling data under normal and emergency conditions,
 - procedures for performing a security check of each area at the end of the work day,
 - procedures for verifying that a genuine emergency exists?
8. Is there a telephone and a list of emergency telephone numbers convenient to the computer room?
9. Are all emergency responsibilities specifically assigned to particular employees?

APPENDIX X-2

10. Are employees familiar with emergency procedures?
11. Is the security plan periodically reviewed for adequacy and appropriateness?
12. Are revisions to the security plan distributed to all employees concerned?
13. Do you consider security in planning changes to the physical facilities which affect the computer centre?
14. Do you periodically invite your local fire department to tour your premises and discuss fire hazards and procedures?
15. Is there a procedure to follow which will protect the integrity of the security system if an employee loses a badge or key?
16. Is compliance with the security standards, procedures, and guidelines readily auditable?

General Plans and Procedures

17. Are existing controls adequate to protect classified incoming data from time of receipt, through conversion, to entry into the system?
18. Are existing controls adequate to protect classified system output through delivery to the end user?
19. Are controls established for exceptions to the normal handling of classified input/output data and documents?
20. Are errors and exceptions in the handling of classified material brought to the attention of people responsible for correcting them?
21. Are the storage areas that are being used to store sensitive data files, operating procedures, and documentation sufficiently secure?
22. Are there adequate procedures for the control of operator console log-in, and operator access to sensitive tapes, disks, programs, and documentation?
23. Are adequate library controls established for sensitive tape and disk volumes? This would include records of usage, copies at different locations, an adequate retention plan, an inventory, and a list of authorized users.
24. Are the security procedures established for blanking or purging intermediate storage (including scratch tapes and disks) after computer processing always applied to information sufficiently sensitive to warrant this additional step?
25. Are all tapes containing unusually sensitive data properly marked, segregated and controlled?

26. Is a separate access log maintained for these tapes?
27. Are tapes and other storage media requiring shipment sufficiently protected against damage, loss or interception?
28. Does the tape library manager receive reports and take corrective action for:
 - tapes on loan an excessive length of time,
 - tapes not located in periodic inventories,
 - tapes authorized for release or return but which can not be located,
 - tapes for which a responsible person is not identified (usually because of changes in personnel or job responsibilities)?
29. Are there operating instructions for every classified job run in the computer centre?
30. Are these operating instructions promptly updated when changes are made?
31. Are these operator instructions clear and complete? Do operator instructions for running each classified job include:
 - identification of all machine components used,
 - identification of all input/output forms,
 - explanation of purpose of run,
 - detailed setup (tape reels, cards, disk to be used, etc.) and end-of-run instructions,
 - identification of all manual switch settings,
 - identification of all possible programmed halts and prescribed restart instructions?

Programming Procedures

32. Does your organization have standards for designing, programming, testing, documenting and operating its systems?
33. Does the programming supervisor periodically review programs and documentation to ensure that the standards are being met?
34. Are control and review procedures established for monitoring program changes and patches for secure systems?

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35. Have checkpoint and restart procedures been incorporated for classified programs which run for longer than fifteen minutes?

Education and Training

36. Are employees notified of their security responsibilities by written notice?
37. Is there a continuing security education program?
38. Are new employees trained on security matters?

Electrical Power

39. Is the computer protected from changes in the power supply voltage, current and frequency?
40. Do you require standby power, and if so, for what time duration?
41. If you have power generating equipment, have you adequate fuel?
42. Does the power generating equipment also support the air conditioning and humidity control systems for the computer room and the computer library?
43. Are the air conditioning and humidity control systems designed so that the remaining units can carry a load for a reasonable time while one unit is being serviced?
44. Is the electrical system's distribution panel accessible only to authorized personnel?
45. Are emergency power switches for the computer and air conditioning systems readily accessible to authorized personnel and clearly marked?

Fire Protection

46. Is the computer centre divided by fire separations for fire control purposes with all partitions made of non-combustible materials?
47. Is each fire control area, such as the computer room, library, storage area, input/output area and programmer area equipped with approved combustion detectors?
48. Is the fire control area, including the areas under raised floors equipped with approved combustion detectors?
49. Are the fire and smoke detection systems tested regularly and are the results recorded in a log book?
50. Has at least one floor panel lifter been placed in a well-marked permanent location and reserved for emergency use?

APPENDIX X-2

51. Are the air conditioning and humidity control system automatically monitored for malfunctions?
52. Are there sufficient conveniently located manual stations for sounding fire alarms?
53. Does an alarm from the automatic detectors or manual stations register on the annunciator of the building fire alarm system?
54. Is the fire alarm system connected to the fire department or an outside protection agency?
55. Is the computer system equipped with an automatic sprinkler system?
56. How is the sprinkler system shut off?
57. If the computer centre has an automatic sprinkler system, can the machines be protected in case of a malfunctioning sprinkler head?
58. Is the computer centre equipped with carbon dioxide or chemical extinguishers to combat machine or electrical fires?
59. Are fire extinguishers inspected regularly to ensure they are serviceable?
60. Have the computer centre personnel been trained in the use of fire extinguishers?
61. Are female employees physically able to operate the manual fire extinguishers?
62. Is "No Smoking" enforced in the computer and tape storage rooms?

Water Protection

63. Is the computer room vulnerable to water damage if the building's waste or water pipes burst?
64. Are the locations of the shut-off valves for the sprinkler system and the building's water supply readily accessible and clearly marked?
65. Are plastic covers available for computer equipment and valuable data storage areas? Are these clearly labelled, and ready for use to provide protection against unusual dust and water from sprinklers, burst pipes, etc.?

Computer Centre Access Control

66. Is the computer centre designated as a "restricted area" where access is limited to authorized personnel?

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67. Is there a receptionist or guard on duty at the entrance to the computer centre to monitor access to it during working hours?
68. Are visitors required to sign a log book when they enter and leave the computer centre?
69. Are visitors prohibited from entering the computer centre after working hours?
70. Are employees and visitors required to wear badges which indicate the areas they are permitted to enter?
71. Do you have the employees' photographs on badges?
72. Do you have approved badge-operated or encoded locks on the doors to the operations area, and are badges with new encoding issued and locks changed periodically?
73. Are pass-through windows used in the computer input and output areas instead of permitting outsiders into these areas?
74. Is a log maintained of all deliveries to and pick-ups from the computer centre, showing the date and time, description of materials and employee authorization?
75. Are all service entrances to the computer centre locked after normal working hours and inspected to make sure they are secure?
76. Is access to the computer centre after normal working hours monitored by a guard service, an approved closed circuit TV and/or an approved alarm system?
77. Are computer operations effectively supervised at all times to ensure that operators do not use your computer equipment and time to run jobs for outsiders without your knowledge?

Remote Terminal Procedures

78. Are all remote terminals accessing computers which process classified data in secure locations?
79. Are only certain persons authorized to operate these terminals?
80. Are there hardware requirements to activate these terminals (for example, identification cards or keys)?
81. Are authorized users assigned identifying code numbers which can be related to programmed tables of authorized codes?
82. Are some terminal users limited in the files that they can access and in the operations that they can perform on files?

83. Are terminals automatically disconnected from the system if they are left unattended for a specified period of time?
84. Is there a centralized record of terminal activity which records:
 - the time of request,
 - the user's identity,
 - the authorization code,
 - the file accessed,
 - the function performed?
85. Are the passwords changed periodically?
86. Is the procedure for assigning passwords tightly controlled?

Personnel

87. Are EDP personnel security cleared in accordance with established criteria?
88. Is access to the computer centre controlled so that no one is allowed "on-site" by himself?
89. Do you have tight control of the access to, and use of, programs and files by systems analysts and programmers?
90. Do operators have access to program flowcharts, source decks, program listings, etc.? (These are not necessary to operators' duties, and should be maintained outside the computer room to prevent changes to programs or operations by computer operators.)
91. Are certain vital jobs rotated among the operations staff?
92. When sensitive applications are being processed, is a representative of the user department present?

Back-up

93. Have you made arrangement for back-up equipment in case your equipment is not operational?
94. Are regular tests of back-up a part of normal procedures?
95. Have you designated which jobs are most critical (in order of priority), in case your equipment is unavailable for a period of time?
96. Do you know the amount of processing time these critical jobs require?
97. Are copies of operating instructions for all systems and programs stored outside the computer centre for back-up purposes?
98. Is the back-up documentation kept up-to-date?

Chapter	XI
Date	
	August, 1974

GUIDE ON EDP ADMINISTRATION

EDP STANDARDS

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APPENDICES

- XI-1. RELEVANT INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO) COMMITTEES, SUB-COMMITTEES AND WORKING GROUPS
- XI-2. EDP STANDARDS APPROVED AND PUBLISHED BY THE CANADIAN STANDARDS ASSOCIATION

DIRECTIVES

- 9.1 The Treasury Board Secretariat, in consultation with the EDP Advisory Committee, shall establish a Government EDP Standards Committee (GESC), which will be responsible for the co-ordination of the work of federal government officers in national and international agencies concerned with EDP standards, and for the development of EDP standards required for the federal public service where suitable national or international standards do not exist.
- 9.2 The Government EDP Standards Committee shall submit through the EDP Advisory Committee any EDP standard which should be approved by the Treasury Board.
- 9.3 Departments and agencies of the federal government shall adhere to Treasury Board Approved EDP standards except when special conditions justify deviations therefrom. When such special conditions are believed to exist, both the Information Systems Division of the Treasury Board Secretariat and the Government EDP Standards Committee secretariat shall be informed immediately by memorandum of the deviation required, the conditions believed to justify the deviation and its expected duration.

GUIDELINES

- 9.4 The Government EDP Standards Committee may approve and issue GESC Recommended EDP standards. Departments and agencies should endeavour to comply with these standards. When compliance is impractical, a brief memorandum stating the reasons for non-compliance and any suggestions for revision of the standard should be sent to the GESC secretariat.
- 9.5 The detailed design specifications or detailed procurement specifications for any information processing system should include a statement of which Treasury Board Approved and GESC Recommended EDP standards are relevant, which have been adopted in the design or procurement, and which have been set aside.

A. INTRODUCTION

The federal government is the largest single user of computers and information processing in Canada. Like other large computer users, the government has an interest in ensuring greater uniformity in the technical features of its computing equipment and the techniques by which the equipment is used in order to promote flexibility, efficiency and economy (so long as this uniformity does not abridge competition among equipment suppliers or prevent technical progress). This interest requires both participation in the development of relevant national and international standards through authorized agencies, and the development and adoption of some standards specifically for federal government computing.

It is government policy to promote the preparation, publication and adoption of standards for an orderly and coherent growth of computer-related work in Canada. Supervisors should encourage suitable employees to take a constructive interest in EDP standards activities.

EDP standards work takes place at three levels, and has somewhat differing characteristics at each. These are:

- the individual department, EDP centre or business establishment;
- the federal government, a provincial government, or a corporation operating major facilities at several locations;
- the national or international level.

EDP standards are often developed by an individual department, EDP centre or business establishment for its own use. Such in-house standards are likely to be primarily of concern to EDP management in the agency, and are likely to be designed to deal with specific problems of the agency. They are, in consequence, likely to be enforced by line authority. They should take account of existing broader standards and of supplier as well as user problems, but this is not always the case.¹

Many corporations which operate major EDP facilities at several locations have developed EDP standards to govern EDP work at all of these locations. These standards are likely to deal with problems common to many or most locations (such as information interchange, program interchange, staff interchange, etc.) and are likely to take account of a broader range of interests (including a broader range of supplier interests and existing national or international standards) than do most in-house standards. The extent to which such standards are enforced by line authority depends on corporate policy; where they exist they have at least a significant influence on the in-house standards developed at particular locations.

The national and international level of EDP standards work is normally characterized by a genuine effort to develop a full consensus among all interests affected by a proposed standard. Where such standards can be developed they are most valuable. But the fact that they must rest on full consensus does restrict the areas in which standards can be formulated and steered through the consensus process. In general, there is no "line authority" to enforce these standards, although in some areas international standards have become a prime interest of national regulatory agencies who can readily ensure compliance (e.g., communications). The Standards Council of Canada was created to foster and promote the development of national standards in Canada, and to ensure and co-ordinate Canadian representation in international standards activities.

1. Some useful suggestions on the development of in-house standards appear in "How to Establish EDP Standards", EDP In-Depth Reports, Vol. 2 No. 10, June, 1973.

The Government EDP Standards Committee is established to deal with the middle level of EDP standards activity. It is also assigned responsibility for developing a Canadian government user position with respect to the EDP activities of national and international standards agencies, including the initiation of requests for new standards and the establishment of a co-ordinated federal government position with respect to standards put forward by these agencies for adoption. It may initiate the development of EDP standards within the public service as necessary, especially where these would promote effective and economical information, program and staff interchange among government facilities, and will approve and publish a directory of all standards adopted as either Treasury Board Approved EDP standards or as GESC Recommended EDP standards.

B. DEFINITIONS

1. A Standard

The Standards Council of Canada defines a standard as approved rules for an orderly approach to a specific activity. The Canadian Standards Association defines a standard as a *thing*, a *feature*, a *method*, or a *process* which is recognized as or agreed to be a model for imitation.

A standard is normally exactly specified and approved by a recognized authority after consultation among prospective users and suppliers, and embodies the degree of consensus achievable at the time it is prepared. A standard differs from directives and guidelines in that its subject matter is normally technically oriented rather than administratively oriented.

2. Treasury Board Approved EDP Standards

A Treasury Board Approved EDP standard is an EDP standard which has been approved by the Government EDP Standards Committee, endorsed by the EDP Advisory Committee, and then approved by the Treasury Board. Treasury Board approval will usually be based on one of the following grounds:

- a. Adoption of the standard will result in a significant net saving to the government.
- b. Adoption of the standard will further government policies and objectives in a cost effective manner.

3. GESC Recommended EDP Standards

A GESC Recommended EDP standard is a standard approved and issued by the GESC, but which has not been formally approved by the Treasury Board.

C. SCOPE OF THE EDP STANDARDS PROGRAM

The standards program with which this chapter is concerned generally encompasses the area of computers and associated information processing systems and peripheral equipment, devices and related media, including data

communications. Included are standards related to machine readable data preparation and data representation, and the characteristics of computer peripherals and ancillaries such as keyboards, line printers, modems, multiplexors, etc. In general this area of activity corresponds to that covered by the International Organization for Standardization (ISO) Technical Committees 95 (Office Machines) and 97 (Computers and Information Processing) (see Appendix XI-1).

It should be noted that there is inevitably much overlap in interest in standards between the GESC and various other interests and groups (e.g., National Library, Post Office, Statistics Canada on representation of data elements). Where an obvious overlap of interest occurs, it is expected that the GESC and other affected organizations will co-operate in taking whatever action is appropriate. Special working groups of qualified people from departments should be set up as required, under the aegis of the GESC, to deal with specific standards activities. The GESC, with its working groups, will be responsible for defining the requirements for EDP standards within the federal government, the development of new EDP standards or adoption of EDP standards already in existence to meet such requirements, and revision of EDP standards as required. It will also act as the co-ordinating body for federal government participation in national and international EDP standards work.

The EDP standards program should not duplicate the work of government regulatory agencies which have responsibility in particular fields. However the GESC may make representations to regulatory agencies in cases where existing regulations do not appear to be fully consistent with desirable EDP standards, and may publicize new or existing regulations within the government EDP community and explain their relevance to EDP work.

D. ROLES AND RESPONSIBILITIES

1. Standards Council of Canada (SCC)

The SCC is the national standards body of Canada. Its purpose is to foster and promote voluntary standardization in the country, to accredit standards writing organizations, and as appropriate, to approve standards produced by these organizations as National Standards. The SCC promotes Canadian participation and represents Canada in international standardization activity through membership in such international bodies as the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC).

2. Canadian Standards Association (CSA)

The CSA is the SCC-accredited Canadian body for the development and approval of Canada-wide EDP software standards (and for standards in many non-EDP fields). The CSA also serves as the Canadian secretariat to certain ISO committees and sub-committees concerned with EDP standards. The committee of CSA which undertakes these tasks is the Sectional Committee for Computers, Information Processing and Office Machines (CIPOM) and its

associated sub-committees and working groups. Although no Canadian body has yet been accredited for the development and approval of EDP hardware standards, CSA has held this responsibility in the past, and is continuing to do so on an interim basis.

3. Department of Communications

Among the responsibilities of the Department of Communications are administering and ratifying Canadian telecommunications standards, and representing Canada in the International Telegraph and Telephone Consultative Committee (CCITT) of the International Telecommunications Union (ITU).

4. Department of Supply and Services — Supply (DSS)

As the department responsible for the acquisition of EDP and other goods and services in the Canadian government, DSS has a particular interest in EDP standards development to assist it in the development of clear, consistent specifications for goods and services to be acquired.

5. Canadian Government Specifications Board (CGSB)

The CGSB is the principal federal government standards writing agency, and is accredited by the SCC to develop and approve national standards in many fields. It is also currently involved in providing support to DSS for federal government procurement of EDP goods and services, particularly for EDP hardware.

6. Government EDP Standards Committee (GESC)

The GESC is responsible for approving EDP standards recommended for general federal government use, and for recommending which EDP standards should receive Treasury Board approval. It is also responsible for arranging for federal government representation on CIPOM and its sub-committees and working groups, and any other accredited EDP standards agency, and, through the chairman, for directing the work of the GESC secretariat.

A more detailed outline of the responsibilities of the GESC and its secretariat is provided in Section E.

E. THE GOVERNMENT EDP STANDARDS COMMITTEE (GESC)

1. Objectives

The overall objectives of the GESC are the co-ordination of the participation of federal government officers in national and international EDP standards work, and the development, approval and implementation of EDP standards in the federal public service. In pursuing these objectives, the committee is expected to work with and through accredited standards agencies to the greatest practical extent.

2. Activities

It is expected that the GESC will engage in the following activities:

- a. Developing and forwarding to the CSA, or any other organization accredited by the Standards Council of Canada as part of the national standards system, by whatever means are appropriate, the Canadian government position on the need for particular EDP standards, on proposed EDP standards and on any other EDP matters put forward for discussion or resolution.
- b. Co-ordinating federal government participation in CIPOM and its working groups and sub-committees, and any other accredited EDP standards agencies.
- c. Initiating standards development activity either by an accredited standards agency or under its own auspices. It is expected that most of the work will be undertaken by interested individuals in the government EDP community, and not by GESC staff. However, the GESC secretariat may, at the request of the chairman of the GESC, also undertake some standards research and development when other arrangements can not be made or when the need is especially urgent.
- d. Recommending through the EDP Advisory Committee any EDP standards which should receive Treasury Board approval.
- e. Approving GESC Recommended EDP standards for use by departments and agencies.
- f. Approving the EDP Standards Directory and its updates as prepared by the GESC secretariat.

3. Membership and Organization

a. Members

There will be two groups of members in the GESC:

I. Ex-officio members:

- i. the officers in charge of each of the EDP centres and designated common-service EDP staffs specified in Appendix III-2,
- ii. one representative named by each of the Department of Communications, the Supply Administration of the Department of Supply and Services, and the Treasury Board Secretariat,
- iii. the Chairman of the GESC (if not already a member),
- iv. one representative nominated by any department approved by the EDP Advisory Committee, and not otherwise represented by an ex-officio member.

II. Individual members:

- any individual public servant elected by the existing membership of GESC because of his interest in and contribution to standards work in the federal government.

The members of the GESC will:

- elect members to the elective positions on the Steering Committee of the GESC,
- elect individual members to the GESC,
- recommend EDP standards projects to the Steering Committee, and assist in staffing approved projects,
- approve the program of EDP standards work recommended by the Steering Committee,
- provide comments on draft standards circulated by the GESC secretariat,
- vote on EDP standards to be recommended for Treasury Board approval or to be adopted as GESC Recommended EDP standards,
- provide information to the GESC secretariat regarding the extent to which EDP standards are applied within their organization.

b. Steering Committee

The Steering Committee of the GESC will consist of:

- the representative named by each of the Department of Communications, the Supply Administration of the Department of Supply and Services, and the Treasury Board Secretariat as members according to sub-section 3.a.I.ii.,
- three members elected by the membership of the GESC for a maximum three-year term,
- the Chairman of the GESC.

The Steering Committee will:

- prepare a program of EDP standards work for approval by the GESC,
- organize working groups for proposed EDP standards projects when the accredited standards agency can not give these early attention, or the need is specific to the federal public service,

- arrange for appropriate Canadian government representation on CIPOM and its working groups, and on any other accredited EDP standards agency,
- determine when proposed standards should be submitted to members for comment or approval.

c. **Chairman**

The Chairman of the GESC will be appointed by the Treasury Board, after consultation with the EDP Advisory Committee. He need not necessarily be a member of the GESC when appointed. The term of appointment will normally be three years. The Chairman will be responsible for:

- directing the work of the GESC secretariat,
- calling and presiding over meetings of the Steering Committee and the GESC,
- appointing a vice-chairman from the members of the Steering Committee, to act for him in his absence.

4. **The GESC Secretariat**

The secretary to the GESC, and any other staff who may be required, will be on the establishment of the Advisory Bureau for Computing, and will be under the direction of the chairman of the GESC. The appointment of any new officer to the secretariat must be approved by the chairman of the GESC.

The secretariat will be responsible for:

- taking minutes at meetings of the GESC,
- circulating information (e.g., draft standards, notice of meetings, minutes, etc.) to members of the Steering Committee and the GESC,
- undertaking research or editing tasks in connection with EDP standards development as directed by the chairman of the GESC,
- publishing and making available to government departments a directory of Treasury Board Approved and GESC Recommended EDP standards, and maintaining an awareness of the degree of compliance with each standard,
- maintaining source files on EDP standards and relevant departmental practices for the use of any federal government employee needing access to such information; and assisting him to find the required information.

5. Meetings of the Steering Committee and the GESC

Meetings of the Steering Committee will be held at the discretion of the chairman of the GESC, but should take place at least twice a year. Meetings of the GESC will also be at the discretion of the chairman, but should take place at least once a year.

F. DEVELOPMENT AND ADOPTION OF STANDARDS

1. Development of Standards

Wherever feasible, International Organization for Standardization (ISO) standards, National Standards of Canada, or standards developed by an accredited EDP standards agency, will be adopted as federal government EDP standards. The GESC will endeavour to work with accredited agencies on standards development. From time to time it may be necessary to proceed with standards development independent of accredited agencies, but in general this should happen only when the need is specific to the federal public service, or the accredited agency can not give a proposal sufficient priority.

Any member of the GESC may recommend an EDP standards project to the Steering Committee, and may propose amendments to the program of work recommended by the Steering Committee in the event that his recommendations are not included or are not given sufficient priority.

The Steering Committee will normally convene Technical Standards Groups to undertake specific tasks of defining requirements for standards, reviewing EDP standards produced by other standards bodies, participating in the work of other EDP standards bodies, developing EDP standards based on approved requirements when this task can not be undertaken by an accredited standards agency, and other matters that it may assign. A Technical Standards Group may consist of one or several experts, and will exist only until the completion of its assigned task. Technical Standards Groups may include industry representatives or other members of the public as appropriate.

Whether the standards development work is directly supportive to an accredited standards agency or is independent, it is expected that work of this type undertaken in the government will normally be done on a voluntary basis and with the assent of the volunteer's supervisor. The GESC secretariat will provide support and assistance to the extent that its resources permit.

2. Adoption of Standards

Before a draft EDP standard can be adopted as a recommended government EDP standard, and before a recommendation that a standard receive Treasury Board approval can be made, the following procedures must be followed:

- the Steering Committee must approve a copy of the for circulation to all members of the GESC giving days to submit written comments,

- the written comments must be circulated to all members of the GESC at least fifteen days before the meeting at which the standards will be considered for adoption, or fifteen days before the due date for a write-in vote.

If as a result of the comments received, substantive changes are made to the standard, the Steering Committee may, at its discretion, recirculate the revised draft to all members for further comment.

If any two members of the Steering Committee request a meeting to approve a standard, approval may not take place by letter ballot. However members absent from approval meetings may register their vote by mail, or may appoint a proxy to represent them at the meeting and vote on their behalf.

A recommended EDP standard must:

- receive at least 60% affirmative votes, with at least two-thirds of GESC members voting, *and*
- receive negative votes from less than 25% of all GESC members.

A standard which is to be recommended for submission to the Treasury Board for approval must:

- be so identified before the vote is taken, *and*
- receive at least 90% affirmative votes, with at least two-thirds of GESC members voting.

Standards which receive this support should be forwarded to the Information Systems Division of the Treasury Board Secretariat to be presented to the EDP Advisory Committee.

RELEVANT INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO) COMMITTEES, SUB-COMMITTEES AND WORKING GROUPS

The following ISO committees, sub-committees (SC) and working groups (WG) were in existence as of December, 1973, and are either directly concerned with EDP standards development, or related to it.

1. Technical Committee 97 — Computers and Information Processing

a. Abridged scope

Standardization in the area of computers and associated information processing systems and peripheral equipment, devices and media relating thereto.

b. Subordinate committees and working groups

SC1	— Vocabulary
WG1	— Vocabulary maintenance
SC2	— Character sets and coding
SC3	— Character and mark recognition
SC5	— Programming languages
SC6	— Data communications
WG1	— New data network and interfaces
WG2	— Control procedures
SC7	— Documentation of computer based systems
SC8	— Numerical control of machines
SC9	— Programming languages for numerical control
WG—	— Technology description
WG—	— Subsets and modular features
SC10	— Magnetic disks
SC11	— Computer magnetic tape
SC12	— Instrumentation magnetic tape
SC13	— Interconnection of equipment
SC14	— Representations of data elements
SC15	— Labelling and file structure

2. Technical Committee 95 — Office Machines

a. Abridged scope

Standardization on terminology and definitions of functions of office machines and other fundamental elements of interest to users and manufacturers of such machines.

NOTE: Although this program may seem to be anomalous it should be noted that much of this area concerns machine readable data preparation and the characteristics of computer peripherals and ancillaries such as keyboards and computer line printers.

APPENDIX XI-1

b. Subordinate committees and working groups

SC4	-	Duplicating and document copying machines
WG1	-	Dimensional aspects of attachment features of duplicating stencils
SC5	-	Dictation machines
SC6	-	Mail processing machines and other special machines
SC7	-	Vocabulary, classification and identification of office machines
SC9	-	Basic form layout and related character and line spacings
SC11	-	Safety characteristics and electrical characteristics
SC12	-	Printing ribbons and their accessories
SC14	-	Keyboard arrangements
SC15	-	Alphanumeric office machines
SC16	-	Symbols used on office machines
WG1	-	Preparatory work
SC17	-	"Credit cards" and identification cards
WG1	-	Identification cards
WG2	-	Machine readable techniques

3. Technical Committee 46 — Documentation

a. Abridged scope

Standardization in the field of documentation, libraries and related information handling, including information systems and interchange networks as applied to documentation.

b. Subordinate committees and working groups

WG1	-	International standard book numbering
WG2	-	Representation and coding of country names
WG3	-	Terminology of documentation
WG5	-	Guidelines for the establishment of thesauri
WG6	-	Bibliographic description
WG7	-	Presentation of publications
SC1	-	Documentary reproduction
WG1	-	Microfiches
WG2	-	Microcopying of technical drawings
WG3	-	Microcopying newspapers
WG4	-	Quality of microcopies
WG5	-	Vocabulary
SC2	-	Conversion of written languages
SC4	-	Automation in documentation
WG1	-	Character sets
WG2	-	Content designators
WG3	-	Bibliographic filing arrangements for catalogues

4. **Technical Committee 154 – Documents and Data Elements
in Administration, Commerce and Industry**

a. **Abridged scope**

Standardization of layout, formats and representation of data used for information interchange within administration, commerce and industry.

NOTE: The word "document" is understood as defined by TC46 and TC97 to be — "a data medium and data recorded on it that generally has permanence and that can be read by man or machine."

b. **Subordinate committees and working groups**

SC1	— Terminology
SC2	— Documents
SC3	— Data elements
SC4	— Filing

**EDP STANDARDS APPROVED AND PUBLISHED BY THE
CANADIAN STANDARDS ASSOCIATION**

NUMBER	STANDARD	STATUS*
Z243.1-1970	Decision tables	Published
Z243.2-1970	Flowchart symbols for information processing (ISO R1028-1969)	Published
Z243.3-1970	Unpunched Paper Perforator Tape	Published
Z243.4	7-bit coded character sets for information processing interchange (based on ISO R646-1967)	Approved
Z243.5-1971	Implementation of the 7-bit coded character set on 9-track 12.7 mm(1/2 inch) magnetic tape (ISO R962-1969 Modified)	Published
Z243.6-1971	Guide for the definition of 4-bit character sets derived from the CSA 7-bit coded character set for information processing interchange (ISO R963-1969 modified)	Published
Z243.7-1971	Magnetic tape labelling and file structure for information interchange (ISO R1001-1969)	Published
Z243.8-1971	Representation of 6 and 7-bit coded character sets on punched tape (ISO R1113-1969)	Published
Z243.10-1972	Use of longitudinal parity to detect errors in information messages (ISO R1155-1967 with modifications December 14, 1971)	Published
Z243.11	Character structure for start/stop and synchronous transmission (ISO R1177-1970 with modifications)	Published
Z243.13	Basic mode control procedures for data communications systems (ISO R1745-1971 with modifications to February 3, 1972)	Published
Z243.20	Representation of calendar date for machine-to-machine data interchange	Approved

* Note that most of these CSA Standards are derived from International Standards.

GUIDE ON EDP ADMINISTRATION

GLOSSARY

AUGUST, 1974

GLOSSARY

This glossary provides definitions for terms which caused some difficulty during the preparation of the EDP guide, or were used in a specialized way in the Guide. It does not attempt to define a complete vocabulary for data processing, procurement, financial administration, security or any of the other topics discussed. There is considerable emphasis on financial terms which are often unfamiliar to EDP specialists; these have been carefully checked against definitions given in the "Guide on Financial Administration" and in "Terminology for Accountants" (Canadian Institute of Chartered Accountants, Toronto, 1962). Suggestions for additions to or deletions from this Glossary would be appreciated.

Accounting systems comprise the books of account, forms, procedures and controls used to record, analyse and report all income and expenditures, receipts and payments and other transactions and events which are in part, at least, of a financial nature. (*Systèmes de comptabilité*)

Accrual accounting is a method of recording transactions by which revenues and expenses are reflected in the accounts in the period in which they are considered to have been earned or incurred, regardless of when these transactions are settled. This term is used in the "Guide on Financial Administration" with the more specialized meaning that "assets and liabilities are reflected in the accounts for the period when goods are received or delivered or when services are performed" (cf. cost-based accounting). (*Comptabilité d'exercice*)

Accruals are provisions entered into accounting systems to enable the reflection in an accounting period of expenses corresponding to resources consumed or services received, and of revenues corresponding to goods or services supplied, whether or not such transactions have been settled in the accounting period by the payment or receipt of cash or its equivalent. (*Comptes courus*)

Activities are means of achieving an objective or set of objectives. The term is also used as in the "Guide on Financial Administration" and the "Program Forecast Manual" to refer to the highest level of Activity classification or the first division of a program, normally that used in Estimates submissions to Parliament. In this latter sense, the parallel concept in the EDP Financial Administration chapter is the group level of the EDP Services classification (cf. Appendix VII-3, section F.4). (*Activités*)

Activity elements are the basic or lowest levels of activity classification. They are the processes or projects carried out to attain a program's objectives, and should normally have an identifiable output for which costs can be usefully and meaningfully determined. (*Éléments d'activité*)

Activity reports are periodic financial reports which summarize costs and revenues by activities and sub-activities. (*Rapports d'activité*)

Assets of an EDP centre consist of all tangible and intangible objects owned by the Crown on behalf of the EDP centre which have a cash value or which are revenue producing in the normal course of business of the EDP centre. *Current assets* include cash, accounts receivable, inventories, prepayments and other items expected to be consumed or converted into cash within a year, and *fixed assets* include owned production equipment and office furniture and fittings. (*Actif*)

Audit trails provide a means of tracing items of data step by step through a processing system, especially from final reports or other outputs back to original source data. In the context of EDP security, audit trails are usually designed to identify and record all users of a system and all significant (in the security sense) program and data entries and exits undertaken by each. (*Pistes de vérification*)

Billing rate structure is an EDP Centre's price list, from which, in conjunction with resource usage, bills to users are normally derived. (*Tarif de facturation*)

Book entry is a non-technical term often used to describe those entries into an EDP centre's accounting system which are in addition to entries required for the regular departmental accounting system. Book entries would include all non-cash entries covering accruals, adjustments, imputed expenses and re-allocations, such as provisions for depreciation or re-allocations of payroll costs to EDP Service elements. (*Écritures comptables*)

Budgets are detailed estimates of future transactions or resource requirements, either in terms of quantities (e.g. man-years) or money values or both, designed to provide a plan for and control over future operations and activities. (*Budgets*)

Capitalized is the term used when expenditures are recorded in a capital asset account which distributes their cost over one or more future fiscal years because the benefits of the expenditures will then be enjoyed. Expenditures under some established amount (such as \$500 or \$1,000) would not normally be capitalized. (*Capitalisé*)

Cash accounting is the method of recording transactions by which revenues and expenses are reflected in the accounts in the period in which the related cash receipts or disbursements occur. (*Comptabilité de caisse*)

Cash flow is the amount of cash generated during a period from all sources, including normal revenue receipts, proceeds from the sale of assets, loans and other monies received. The *net cash flow* is the cash flowing into the accounting entity less cash disbursements. (*Mouvement de trésorerie*)

Charts of accounts are lists of the account classifications and codes which provide the framework for gathering and making visible all the financial information required by an accounting entity. (*Plans comptables*)

Chief programmer teams are a technique for managing large programming assignments by organizing the work around a senior architect-programmer and a senior back-up programmer, who are personally responsible for specifying the segments of a programmed system and for coding critical modules and program interfaces. All members of the team, including the chief programmer and his back-up, must submit runs through and provide documentation to a programming secretary who maintains a development support library. This system is claimed to improve productivity by facilitating the use of special skills. It also ensures that at least two persons fully understand all parts of a developing system. (*Équipes de programmation senior*)

Classified information is official government information or material which, in the national interest, must be protected as defined in the document entitled "Security of Information in the Public Service". (*Information classifiée*)

Collator codes are labour saving codes used to reduce the number of code digits placed on documents prior to their entry into the accounting system. Later, in the data processing phase the full coding may be generated as required. (*Codes en abrégé*)

Commitments are obligations to make payments at future dates regardless of the dates on which services are rendered or billings are received. Commitments may be either contractual or conditional (cf. Guide on Financial Administration, Part II, Ch. VI). (*Engagements*)

Commitment accounting is the practice of recording transactions so that they are reflected in the accounts for the period when an obligation to make a future payment is first foreseen, such as when contracts are entered into or orders are placed for goods and services. (*Comptabilité des engagements*)

Common-service EDP staffs are staffs which provide one or more EDP services to more than one program or activity as defined for departmental Program Forecast purposes. (*Service d'informatique*)

Common-service overhead costs are costs which are incurred by some central or departmental service unit in order to provide a service to all public service or departmental staffs, and which are not normally charged to the staffs receiving the service. (*Frais généraux du service commun*)

Compatible EDP equipment or services are equipment or services which do not require application program conversion, staff retraining or supporting capital expenditures in excess of 10% of annual rental or service costs in order to be substituted for equipment or services in use. (*Équipement ou services d'informatique compatibles*)

Contra accounts are offsetting accounts used to retain in an accounting system information that would be netted out if only one account were used. For example, one account may be charged when expenses are incurred, another account credited when funds are recovered for the same transaction. By using contra accounts, information relating to both sides of the transaction is more readily available (cf. "Guide on Financial Administration", Part II, Ch. VIII, Appendix 2). (*Comptes de contre-parties*)

Control accounts are accounts in a principal accounting system whose balance at any point in time is equal to the total of the balances of a number of detailed accounts in a subsidiary system. (*Comptes de contrôle*)

Cost-based accounting is a method of recording transactions so that revenues and expenses are reflected in the accounts for the period when resources are earned or consumed (cf. "Guide on Financial Administration", Part II, Ch. VIII). (*Comptabilité de prix de revient*)

Cost centres are organizational units below the level of the responsibility centre (see definition below). Cost centres may be identified to satisfy a responsibility centre manager's needs for financial information on lower level organizational units to which budgetary and spending authority are not delegated. (*Sections de frais*)

Costs are dollar measures of resources consumed during a period of time, without regard to when ordered, delivered or paid (cf. "EDP Costs", Ch. VII, Part B, and Appendix VII-3, Part C). (*Coûts*)

Depreciation refers to the gradual exhaustion of the service capacity or value of fixed assets such as buildings and equipment because of wear and tear, obsolescence and inadequacy. In accounting, depreciation is represented by a proportionate charge as an expense to each accounting period throughout the life of the assets. (*Dépréciation*)

Directives are mandatory instructions involving system elements essential to the attainment of policy objectives. (*Directives*)

Double entry bookkeeping rests upon the twofold aspect of every transaction representing an exchange of values (a value given and a value received) or upon the twofold aspect of everything of value (the valuable possession itself and the equities in or claims against such value). In this system of bookkeeping every transaction is recorded in one or more accounts as a debit and in one or more as a credit in such a manner that the total of the debit entries equals the total of the credit entries. (*Comptabilité en partie double*)

Electronic data processing (EDP) includes all use of general purpose digital computers and of auxiliary equipment operating in support of computers (including electro-mechanical unit record equipment). In this Guide, the phrase excludes any computers or other EDP equipment which are acquired as an integral part of a special purpose system not designed or easily used for general purpose data processing (cf. Ch. VI, Part A). (*Informatique*)

EDP centres are the departmental, functional and service-wide application centres identified in the current edition of the EDP Master Plan. As used in this Guide, the term often also includes other common-service EDP staffs. (*Centres d'informatique*)

EDP personnel includes all staffs employed to supply EDP services to support government programs, such as computer systems analysts, programmers, computer and unit record operators, EDP equipment maintenance staff, keypunch and related equipment operators, OCR typists, data control staffs, tape librarians, clerical or other EDP support staffs, and the supervisors and managers responsible for these functions. It does not include computer users who prepare programs or operate equipment in support of their own primary functions, or clerical personnel whose main duties are the coding of input data, the transcribing or editing of output data, or similar non-EDP operations. (*Personnel d'informatique*)

EDP projects may refer either to projects (as defined for departmental purposes) for which the full cost of EDP resources used forms more than the lesser of ten per cent of the full project cost or \$250,000, or to the separable EDP components of such projects. EDP projects may be either developmental (not yet implemented) or on-going (already implemented — sometimes referred to as applications). (*Projets d'informatique*)

EDP public records are those public records (as defined in the "Public Records Order") that are specifically created for the use of, or are generated by means of EDP equipment (cf. Chapter IX). (*Documents publics (ou archives publiques) d'informatique*)

EDP resources includes all staff and equipment employed primarily in the provision of EDP consulting, analysis, programming, data conversion, equipment operation or other services, and also the funds used to purchase such services. (*Ressources d'informatique*)

EDP service elements are the EDP processes carried out to support substantive programs. They are the finest level to which EDP services can be subdivided while still having an identifiable output for which costs can be usefully and meaningfully determined. "Service elements" or "services" are sometimes used as abbreviations for "EDP service elements". (*Éléments de service d'informatique*)

EDP services usually refers to the items of the classification of EDP services listed in Appendix VII-2 and described in Appendix VII-3, section F-4. It is also used more generally to refer to the support provided to substantive programs by EDP resources. "Services" is sometimes used as an abbreviation for "EDP services". (*Services d'informatique*)

Expense includes all costs incurred in the process of earning the revenue attributed to a period, including those costs not assignable to any particular revenue but incurred during the period in the course of ordinary operations and not assignable to the operations of a future period or periods. (*Dépenses*)

Expensed is the term used to describe the accounting treatment when the cost of goods and services purchased or consumed is classified in accounting records as part of current operating cost. (*Inscrit aux dépenses*)

External services are services supplied by personnel not included in the establishment of the user department or by equipment not on the premises of and under the control of the user department, or by functional centres or SWAC's. (*Services externes*)

Fixed assets are tangible, durable assets or processes purchased and held to produce over a period of years other goods and services from which revenue will be derived. Insignificant fixed assets costing less than an established amount (such as \$500 or \$1,000) are not normally capitalized. (*Immobilisations*)

Full costs of EDP include all direct and indirect costs incurred in order to obtain the EDP outputs required by government programs served by EDP (cf. guideline 5.6, and Ch. VII, section B.1). (*Coût intégral de l'informatique*)

Guidelines are non-mandatory recommendations identifying courses of action or alternative courses of action which would satisfactorily implement particular aspects of Treasury Board policies and directives. (*Lignes directrices*)

Host department is the department to which an EDP centre is attached for administrative purposes. In the case of functional centres or service-wide application centres the host department is the custodian department. (*Ministère d'accueil*)

Imputed rentals are charges against operations for fixed assets purchased and used. These charges should be calculated on the basis described in Chapter VII, sub-section B.2.b.ii and Appendix VII-3, section B.4. (*Location imputée*)

Income is the net profit on operations for any accounting period (cf. Revenue). (*Revenu net*)

Incremental cost is that additional cost incurred to provide a particular service or unit of service which is over and above those costs which would be incurred if the service or unit of service were not provided. (*Coût additionnel*)

In-house services are services supplied by personnel included in the establishment of the user department or by equipment on the premises of and under the control of the user department (except for functional centres or SWAC's). (*Services internes*)

Liabilities include all amounts owing for goods and services received, fixed assets purchased, and loans and advances received, both short and long term. (*Passif*)

Line objects are classifications of expenditure at the source, and are the lowest level of classification employed in distinguishing the nature of goods or services acquired. They are either coincident with Economic Objects or represent subdivisions thereof. For EDP accounts they should also be coincident with or subdivisions of the classes of the EDP Expenses and Income classification. (*Articles d'exécution*)

Memorandum accounts are accounts created in a subsidiary accounting system to record and classify financial data not required by the parent accounting system (e.g., to record data required to convert a cash accounting system to a cost-based or accrual accounting system). (*Comptes auxiliaires*)

Memorandum cost allocation refers to the recording and allocation of non-cash costs (such as depreciation and accommodation costs) or the re-allocation of cash expenditures through an accounting system subsidiary to the cash-based Government of Canada accounting system. (*Provisions auxiliaires*)

Memorandum entries (see Book entry). (*Écritures auxiliaires*)

Operating results, as the term is used in this Guide, are the difference between the actual or pseudo revenues of an EDP centre or unit and its full costs. In accounting the term may refer either to the overall profit or loss or, more narrowly, to the difference between operating expenses and operating revenue. (*Résultats d'opération (ou d'exploitation)*)

Overhead costs are the costs of personnel, materials and services which cannot be directly identified with any service or product provided to customers. (*Frais généraux*)

Performance criteria are the standards of service, equipment utilization, profitability, etc. which an EDP unit is expected to achieve, and by which it will be judged by senior management. (*Critères de rendement*)

Prices may refer to the rates at which users are charged for the use of EDP services, or the rates used in calculating the value of EDP resources consumed in support of a program or project. (Types of prices are discussed in Chapter VII, section C.2). (*Prix*)

Private sector resources include all resources not part of the federal public service, and include resources which may be made available by crown corporations, other levels of government, or universities and similar institutions, as well as by private firms. (*Ressources du secteur privé*)

Processability is the quality of being suitable for processing on specific EDP equipment, and of providing accurate results when handled according to standard procedures or special instructions supplied. (*Potentiel de traitement*)

Programs

1. Groups of related departmental activities designed to achieve specific objectives authorized by Parliament.

2. Complete sequences of machine instructions and routines necessary for a computer operation.

(*Programmes*)

Project phases are elements of a project identified separately for costing and control purposes. (*Phases d'un projet*)

Projects are specific departmental activities, sub-activities or activity elements designed to achieve a specific purpose, and requiring resource inputs. Projects may occasionally cross departmental boundaries, but these will usually be broken into departmental segments for budgetary purposes. As the term is used in this Guide, projects may be either developmental or ongoing (cf. EDP Projects). (*Projets*)

Pseudo revenues are revenues which would be received by an EDP centre or service unit if it actually charged its users at applicable prices for services supplied. (*Pseudo-revenus*)

Responsibility centres are organizational units to which budgetary and spending authority are delegated. A responsibility centre may share responsibility for a single activity or EDP service or participate in several activities or services. In either case the extent of its contribution to each activity or service must be identified in terms of elements which can be costed. (*Centres de responsabilités*)

Responsibility reports are periodic financial reports which summarize costs and revenues by responsibility centre. (*Rapports de responsabilité*)

Revenue is the gross proceeds accruing from all operations and activities of an accounting entity (cf. *Income*). (*Revenu*)

Services and Service elements: see EDP Services and EDP Service Elements. (*Services et éléments de service*)

Set up each month and reversed the following month means that liabilities (revenues) for goods or services received (provided) but not recorded as accounts payable (receivable) will be set up as an accrual (and therefore become a cost or revenue) in the month being reported on. The following month, when presumably the items are paid (payment is received), there would be a double accounting unless the accrual is reversed. If some of the items are unpaid (unreceived) at the end of the following month they would be accrued again. (*Établi chaque mois et inversé le mois suivant*)

Shadow budgets are estimates of the value of resources required to carry out approved plans, but for which actual payment need not be made or collected by the budgetor. (*Budgets fictifs*)

Standards are *things, features, methods or processes* which are recognized as or agreed to be models for imitation. They are normally exactly specified and approved by a recognized authority after consultation among prospective users and suppliers. (*Normes*)

Structured programming is a manner of organizing and coding programs so that they can be read from top to bottom without ever branching to a point which is more than a few lines away. It generally requires the avoidance of "GOTO" statements and statement labels, the division of programs into a hierarchy of very small modules with single entry and exit points, and the use of indentation to distinguish related groups of instructions in any module. Its purpose is to make it easy to follow the logic of the program, and hence to debug, maintain and modify it. (*Programmation structurée*)

Surplus capacity is capacity which is unlikely to be required to meet the needs of designated or otherwise committed users of an EDP facility, and does not include capacity needed to provide a reasonable reserve against fluctuations in the service requirements of these users. (*Capacité en excédent (ou excédent de capacité)*)

Transparent is used with reference to EDP to refer to a change made by a supplier of goods or services which does not affect the user's method of using the goods or services or the results which he receives from their use. (*Transparent*)

User refers to the organization requiring EDP services in support of a substantive program or project. (*Utilisateur*)

Variances are the differences between budgeted volumes, costs and revenues for a period and actual volumes, costs and revenues for the same period. (*Écart*)

